2/3/27

Vol. XXV. Part 2.

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NATIONAL MUSEUM MELBOURNE

The Journal of the Department of Agriculture of Victoria, Australia.

February, 1927.

PRINCIPAL CONTENTS

Potato Manure Trials

Plant Pathology—Studies in Europe and America

Cool Storage of Washington Navel Oranges

Crop and Fallow Competitions

Grading Land for Lucerne

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OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

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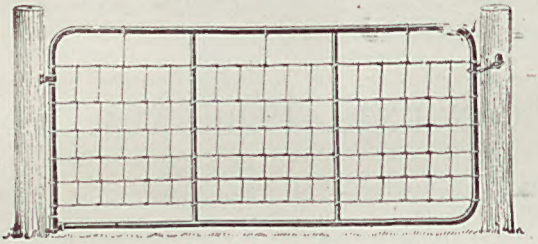

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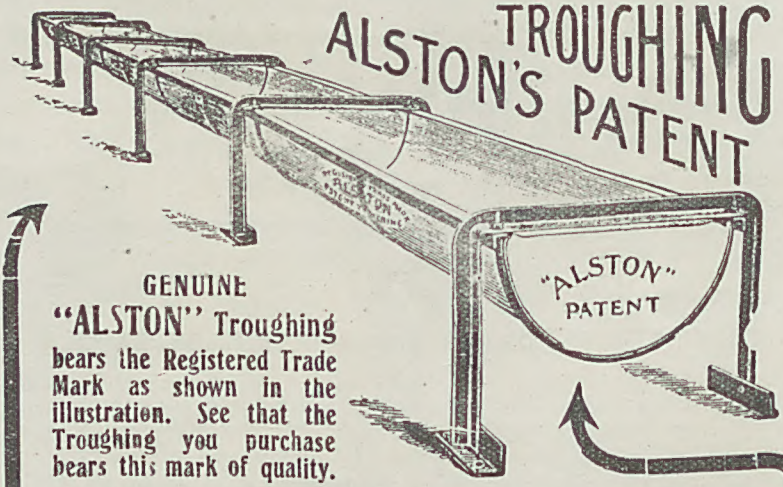

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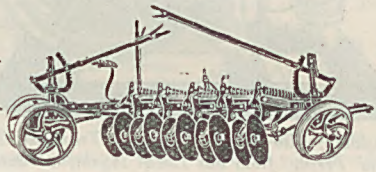

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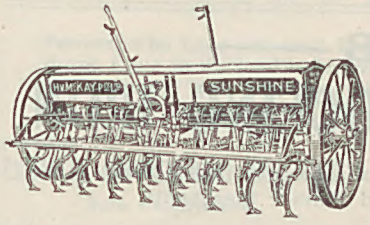

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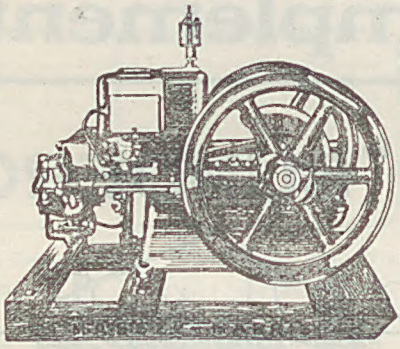

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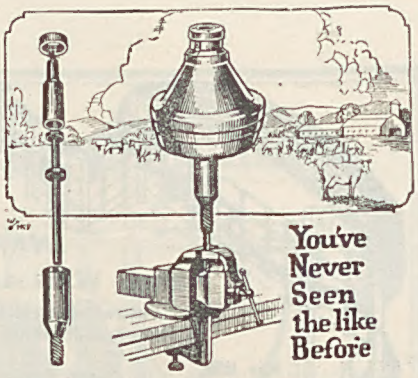

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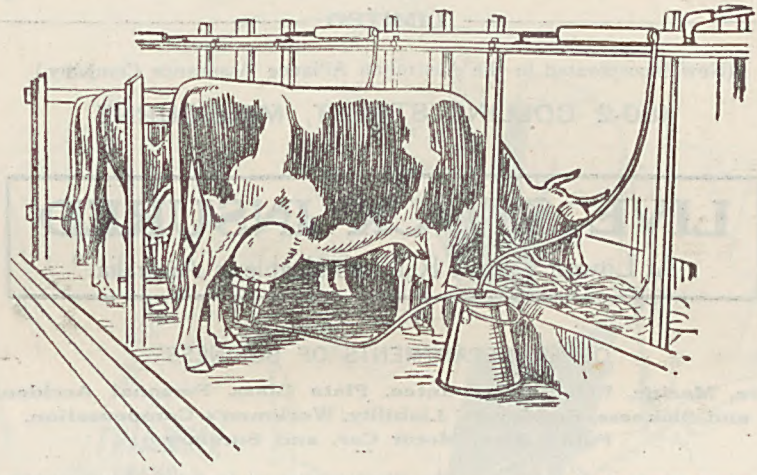

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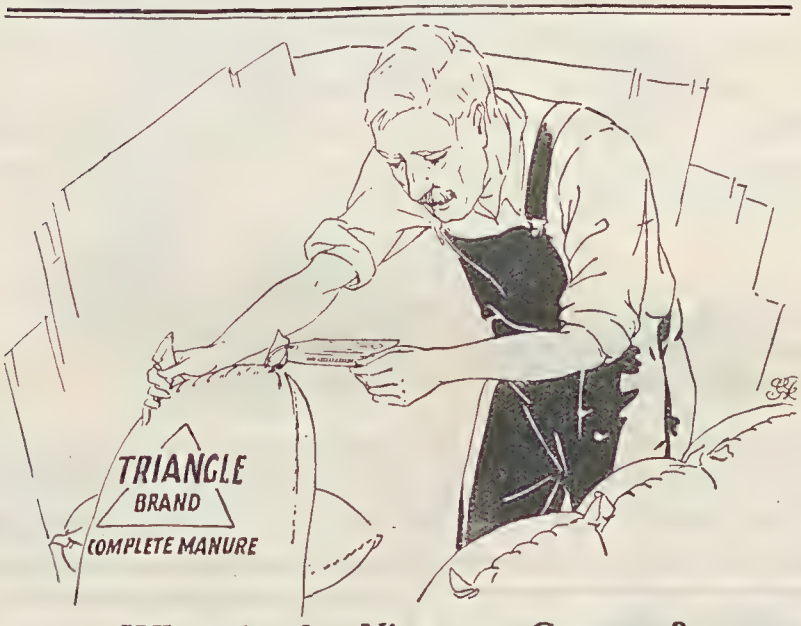

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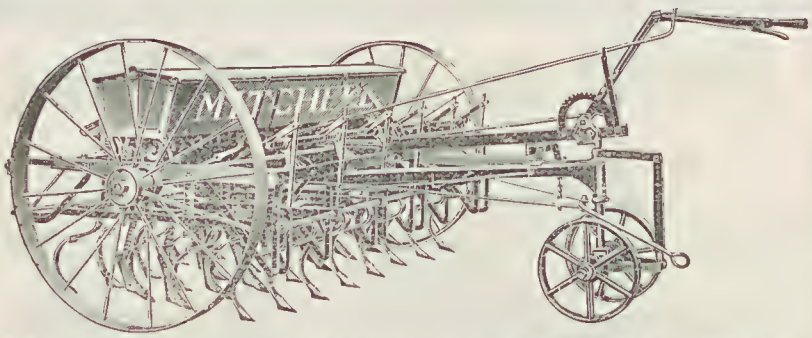

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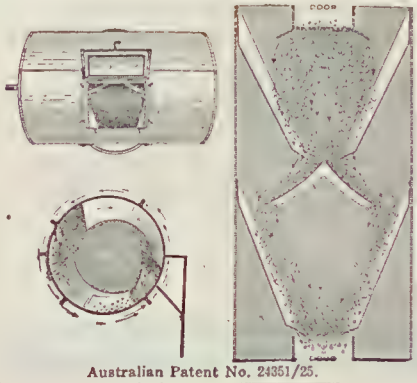

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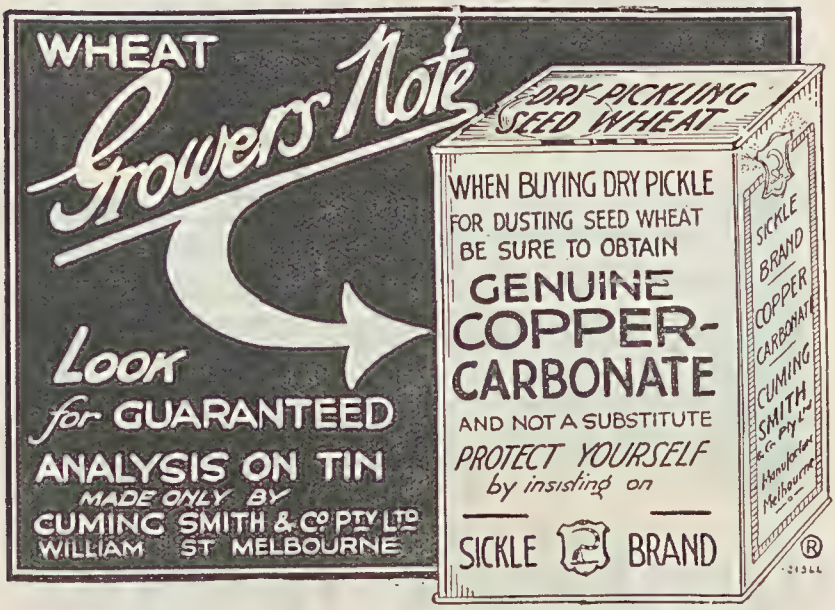

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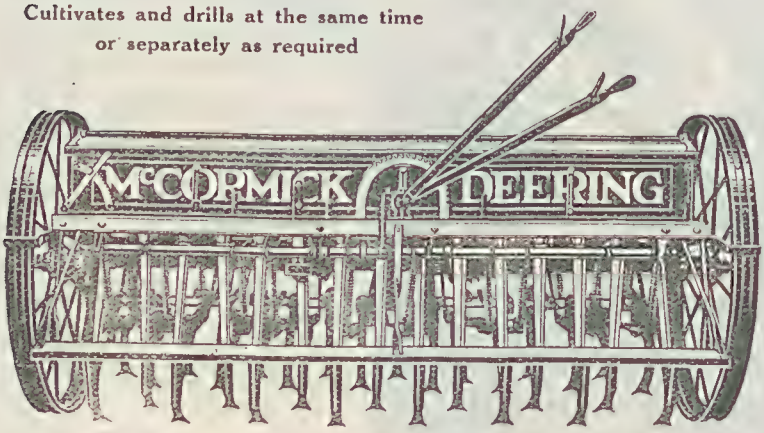

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THE JOURNAL

OF THE

Department of Agriculture

OF

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Vol. XXV. February, 1927. Part 2.

POTATO MANURE TRIALS.

AVERAGE PRODUCTION AND VALUES FOR THREE YEARS FROM VARIOUS MANURES AT FIVE VICTORIAN STATIONS.

By J. T. Ramsay, Potato Expert.

In the potato manurial experiments, it was decided at the beginning of the 1923-24 season to adopt a standard variation of manures, and the rates per acre at which they were to be applied. This standard variation was to be given to all classes of soil, in which trials were conducted, for a number of years, in order that, as far as possible, varying seasonal influences could be averaged.

Averaging is the only possible means of arriving at results which can be taken as a sound guide as to what system and rate of manuring is likely to give the maximum returns. The reason for this is that seasonal influences cannot be eliminated, nor even controlled, except to a very modified degree.

The standard variation of kind and quantity of manures was based on the experience of many years of experimental work, and the range in the variation was arrived at by estimating, from past results, what was likely to embrace the dressings which would give the best average increase in yield, together with the best average return for the money invested in fertilizers.

During the past three years these manure trials have been conducted at five centres, viz., Millbrook, Trentham, Catani, Korumburra, and Thorpdale. The soils at each of these stations are each typical and representative of considerable areas of land suited to the production of the potato crop, so that the application of the results concerns an appreciable percentage of the total area in the State of Victoria devoted to potato cultivation.

The climatic variations during the three years under review were considerable. The rainfall during the growing period of the season 1923-4 was above average, that of 1924-5 about average, and that of 1925-6 below average.

These inevitable and non-controllable fluctuations of rainfall during the period of development and maturation of the crop exercise, of course, a corresponding influence on the functioning of the artificial fertilizers, and make it at once obvious why the results obtained in any one year may or may not be a true guide as to the best system of manuring to be adopted.

For that reason, since the adoption of this scheme of establishing a standard variation of manuring to be applied at all experimental stations, I have refrained from dwelling too strongly on the results obtained in any one year. The greater the number from which an average is obtained, the truer that average is likely to be. Since, however, figures for three years are now on record, and since the seasonal differences during that period cover a range of above average, below average, as well as the average itself, opportunity is taken here to present the returns.

For many years it was contended by farmers of the red volcanic belt in the central highlands of Victoria, that that class of soil would not profitably respond to the application of artificial fertilizer. During the six years in which the Department of Agriculture has carried out experimental work in such soil, the results obtained have exploded that theory. Nevertheless, it has been shown during that time that this class of soil will not respond proportionately, either in increased weight per acre or from the economic point of view, to dressings of more than something in the vicinity of 3 cwt. to the acre. To have gained definite information on such a point, supported by authentic figures, is to have achieved something of much value to farmers operating in red volcanic soils.

It has long been estimated that Gippsland soils and climates would respond economically to fairly heavy dressings of manure, and, in view of that, it is not surprising to have verification of this, in the table of results given below.

Lime, as a soil ameliorative for the potato crop, has not, during my experience of it in Victoria, justified its cost, except in very exceptional cases, and for that reason I have consistently refrained from advising growers to go to the fairly heavy expense of its application—but of that more anon.

In arranging the following table of results I have endeavoured to present them in a manner understandable by all, and have expressed the results as often as possible in terms of £ s. d. Growers will, I am sure, appreciate this way of giving results, as the pounds, shillings, and pence aspect is the main reason for their being in or being out of the business of potato cultivation. In computing values, £8 per ton has been taken. This rate, I think, is really below the average market rate for the past three years, and, because of that, makes the figures all the more valuable.

Further, in calculating crop values only the value of the market-sized tubers has been taken into consideration, and the weights and values are taken from sections where no lime was applied.

Table I.—Average Results at MILLBROOK (Red Volcanic Soil) for the three years 1923-24 to 1925-26, showing Returns from various Manurial Dressings.

(Potatoes valued at £8 per ton.)

Manure.	Market Tubers.	Increase from Manure.	Cost of Manure.	Cost per Ton Increase.	Increased Value per Acre.	Net Increased Value per Acre.
	T. c. q.	T. c. q.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
3 cwt. Super. per acre ...	9 10 0	3 2 1	0 18 9	0 6 0	24 18 0	23 19 3
6 cwt. Super. per acre ...	9 3 3	2 17 0	1 17 6	0 13 3	22 16 0	20 18 6
9 cwt. Super. per acre ..	9 5 3	2 19 0	2 16 3	0 19 0	23 12 0	20 15 9
6 cwt. Super., 1 Pot. Sulph. per acre	9 10 3	3 3 0	2 13 0	0 16 10	25 4 0	22 11 0
No Manure	6 7 3	..	..	..	..	..
6 cwt. Super., 1 Amm. Sulph. per acre	9 16 0	3 8 1	2 15 0	0 16 2	27 6 0	24 11 0
6 cwt. Super., 1 cwt. Amm. Sulph., 1 cwt. Pot. Sulph. per acre	9 14 0	3 6 1	3 10 6	1 2 0	26 10 0	22 19 6
3 cwt. Market Garden Manure per acre	10 1 0	3 13 1	1 8 6	0 7 10	29 6 0	27 17 6
3 cwt. Basic Phos. per acre ..	9 14 0	3 6 1	0 18 9	0 5 8	26 10 0	25 11 3

Table II.—Average Results at TRENTHAM (Red Volcanic Soil) for the three years 1923-24 to 1925-26, showing Returns from various Manurial Dressings.

(Potatoes valued at £8 per ton.)

Manure.	Market Tubers.	Increase from Manure.	Cost of Manure.	Cost per Ton Increase.	Increased Value per Acre.	Net Increased Value per Acre.
	T. c. q.	T. c. q.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
3 cwt. Super. per acre ..	6 17 2	3 18 2	0 18 9	0 4 10	31 8 0	30 9 3
6 cwt. Super. per acre ..	6 18 1	3 19 1	1 17 6	0 9 6	31 14 0	29 16 6
9 cwt. Super. per acre ..	6 11 3	3 12 3	2 16 3	0 15 6	29 2 0	26 5 9
6 cwt. Super., 1 cwt. Pot. Sulph. per acre ..	6 11 3	3 12 3	2 13 0	0 14 6	29 2 0	26 9 0
No Manure	2 19 0	..	..	..	..	..
6 cwt. Super., 1 cwt. Amm. Sulph. per acre ..	7 1 3	4 2 3	2 15 0	0 13 3	33 2 0	30 7 0
6 cwt. Super., 1 cwt. Amm. Sulph., 1 cwt. Pot. Sulph. per acre	6 18 1	3 19 1	3 10 6	0 17 9	31 14 0	28 3 6
3 cwt. Market Garden Manure per acre	5 13 1	2 14 1	1 8 6	0 10 6	21 14 0	20 5 6
3 cwt. Basic Phos. per acre ..	5 9 0	2 10 0	0 18 9	0 7 6	20 0 0	19 1 3

Comments on Millbrook and Trentham Results.

The above table, obtained from Millbrook experiments, applies to a rich red volcanic belt situated on the Ballarat line, 58 miles from Melbourne. This soil is fairly representative of a belt of land extending north and westward through Daylesford towards Kyneton.

The outstanding features of three years' averages in this soil are that it responds best to light dressings of manures containing principally phosphoric acid, and the small cost per ton for each ton increase where this class of manure is used. It will be noted that all the manures used show a considerably increased value per acre, but give the maximum benefit from the light ratings.

Trentham, at the north-western end of this belt of red volcanic soil, shows similar peculiarities of manurial action, but it is noteworthy that here, too, superphosphate stands out prominently as being the best form of phosphatic manure to which this soil responds.

Table III.—Average Results at CATANI (Swamp Peat) for the three years 1923-24 to 1925-26, showing Returns from the various Manurial Dressings.

(Potatoes valued at £8 per ton.)

Manure.	Market Tubers.	Increase from Manure.	Cost of Manure.	Cost per Ton Increase.	Increased Value per Acre.	Net Increased Value per Acre.
	T. c. q.	T. c. q.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
3 cwt. Super. per acre ..	6 7 0	2 9 2	0 18 9	0 7 7	19 16 0	18 17 3
6 cwt. Super. per acre ..	7 2 1	3 4 3	1 17 6	0 11 8	25 18 0	24 0 6
9 cwt. Super. per acre ..	8 6 0	4 8 2	2 16 3	0 12 8	35 8 0	32 11 3
6 cwt. Super., 1 cwt. Pot. Sulph. per acre	6 15 3	2 18 1	2 13 0	0 18 4	23 6 0	20 13 0
No Manure	3 17 2	..	..	..	..	..
6 cwt. Super., 1 cwt. Amm. Sulph. per acre	9 10 1	5 12 3	2 15 0	0 9 9	45 2 0	42 7 0
6 cwt. Super., 1 cwt. Amm. Sulph., 1 cwt. Pot. Sulph. per acre	9 19 3	6 2 1	3 10 6	0 11 6	48 18 0	45 7 6
3 cwt. Market Garden Manure per acre	6 3 3	2 6 1	1 8 6	0 12 2	18 16 0	16 7 6
3 cwt. Basic Phos. per acre ..	7 11 2	3 14 0	0 18 9	0 5 1	29 12 0	28 13 3

Comments on the Catani Results.

The soil at Catani, on the Koo-wee-rup Swamp, in Gippsland, about 50 miles from Melbourne, in a south-easterly direction, is comprised of swamp peat, which was reclaimed by drainage some 30 years ago. Since then it has proved very productive; not so much because of its inherent fertility, but because it is such a splended medium for the production of root crops. Indeed, so popular has it become as a source of potatoes, that it produces on the average about 20 per cent. of the State's total crop. The reasons for this are a combination of soil of such texture as to permit its manipulation with the lightest of draught, such soil having a high capacity for moisture retention, ready response to manure, and easy distance from the principal market of the State.

While Catani soil is representative of a large area on the swamp, it is not contended for one moment that it is typical of the whole swamp, for such is anything but the case.

The potato crop is of such importance here, however, that the results are of vital interest to all growers in the district, amongst some of whom there still exists apathy, or antagonism, to progressive manurial treatment of soil.

The average results gained at Catani indicate the wisdom of heavy manuring. Heavy dressings of superphosphate, in conjunction with nitrogen and potash, produced the maximum average return. It is interesting to note the progressive increase from light to heavy phosphatic dressings. Six hundredweight of superphosphate increased the yield over 3 cwt. by 30 per cent., while 9 cwt. exceeded the weight made by 6 cwt. super. by another 30 per cent. approximately.

The combination of 6 cwt. super., plus 1 cwt. ammonium sulphate, and the complete manure rating shown in plot 7, gave excellent and profitable results, even after deducting the tax of manure costs.

It is interesting to note that in these experiments, while superphosphate and basic phosphate hold the palm as far as the actual cost per ton of each ton increase, the highest net returns are gained from the use of heavier dressings of complete manures.

Table IV.—Average Results at KORUMBURRA (Grey Clay Loam) for the three years 1923-24 to 1925-26, showing Returns from various Manurial Dressings.

(Potatoes valued at £8 per ton.)

Manure.	Market Tubers.	Increase from Manure.	Cost of Manure.	Cost per Ton Increase.	Increased Value per Acre.	Net Increased Value per Acre.
	T. c. q.	T. c. q.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
3 cwt. Super. per acre ..	7 5 0	3 6 3	0 18 9	0 5 6	26 8 0	25 9 3
6 cwt. Super. per acre ..	7 18 1	4 0 0	1 17 6	0 9 5	32 0 0	30 2 6
9 cwt. Super. per acre ..	7 6 3	3 8 2	2 16 3	0 16 6	27 8 0	24 11 3
6 cwt. Super., 1 cwt. Pot. Sulph. per acre	7 5 3	3 7 2	2 13 0	0 15 8	27 0 0	24 6 0
No Manure	3 18 1	..	..	..	..	..
6 cwt. Super., 1 cwt. Amm. Sulph. per acre	8 3 0	4 4 1	2 15 0	0 13 1	33 14 0	30 19 0
6 cwt. Super., 1 cwt. Amm. Sulph., 1 cwt. Pot. Sulph. per acre	7 15 0	3 16 3	3 10 6	0 18 5	30 14 0	27 3 6
3 cwt. Market Garden Manure per acre	5 5 3	1 7 2	1 8 6	1 0 9	11 0 0	9 11 6
3 cwt. Basic Phos. per acre ..	5 4 0	1 5 3	0 18 9	0 15 0	10 6 0	9 7 3

Comments on the Korumburra Results.

Korumburra, 70 miles south-east of Melbourne, with grey clay loam soil, and an altitude of 750 feet above sea level, is an entirely different proposition from the Catani flats, yet it also shows considerable responsiveness to liberal dressings of manure.

In this case the best rate of phosphoric acid manuring is shown to be 6 cwt. superphosphate per acre, but profitable augmentation to this was obtained by the addition of 1 cwt. sulphate of ammonia per acre.

It will be remarked that a slight depression in yield took place where the heaviest dressing of 9 cwt. super. per acre was tested against 6 cwt. super. per acre.

I have not been able to ascertain, definitely, the reason why the application of a manure at a rate in excess of the crop's requirements should actually decrease the yield, but that such an effect is produced is certainly correct, as proven by repeated results and observations.

Table V.—Average Results at THORPDALE (Chocolate Loam) for the three years 1923-24 to 1925-26, showing Returns from various Manurial Dressings.

(Potatoes valued at £8 per ton.)

Manure.	Market Tubers.	Increase from Manure.	Cost of Manure.	Cost per Ton Increase.	Increased Value per Acre.	Net Increased Value per Acre.
	T. c. q.	T. c. q.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
3 cwt. Super. per acre ..	5 11 3	2 18 2	0 18 9	0 6 7	23 8 0	22 9 3
6 cwt. Super. per acre ..	6 4 3	3 11 2	1 17 6	0 10 8	28 12 0	26 14 6
9 cwt. Super. per acre ..	6 3 3	3 10 2	2 16 3	0 16 0	28 4 0	25 7 9
6 cwt. Super., 1 cwt. Pot. Sulph. per acre	6 2 3	3 9 2	2 13 0	0 15 4	27 16 0	25 3 0
No Manure	2 13 1	..	..	..	..	..
6 cwt. Super., 1 cwt. Amm. Sulph. per acre	6 15 0	4 1 3	2 15 0	0 13 0	32 14 0	29 19 0
6 cwt. Super., 1 cwt. Amm. Sulph., 1 cwt. Pot. Sulph. per acre	6 15 1	4 2 0	3 10 6	0 17 3	32 16 0	29 5 6
3 cwt. Market Garden Manure per acre	5 10 0	2 16 3	1 8 6	0 10 0	22 14 0	21 5 6
3 cwt. Basic Phos. per acre ..	5 12 2	2 19 1	0 18 9	0 6 6	23 14 0	22 15 3

Comments on the Thorpdale Results.

The Thorpdale chocolate loam country is another variety of soil in the Gippsland hills, with an altitude of about 800.

The 6 cwt. super., plus 1 cwt. ammonium sulphate, per acre dressing appears to give the maximum tonnage and monetary return here. This rate shows a marked percentage increase in value of the crop over all other variations of manurial treatment.

The table of the Thorpdale results is given hereunder:—

Table VI.—Average net Cash Increase per acre over No-manure Plots for three years 1923-24 to 1925-26, Gippsland (Catani, Korumburra, and Thorpdale).

	£ s. d.
3 cwt. Super. per acre	22 5 3
6 cwt. Super. per acre	26 19 2
9 cwt. Super. per acre	27 10 3
6 cwt. Super., 1 cwt. Pot. Sulph. per acre ..	23 7 4
No Manure	..
6 cwt. Super., 1 cwt. Amm. Sulph. per acre ..	34 8 4
6 cwt. Super., 1 cwt. Amm. Sulph., 1 cwt. Pot. Sulph. per acre	33 18 10
3 cwt. Market Garden Manure per acre	15 14 10
3 cwt. Basic Phos. per acre	20 5 3

In Table VI. I have grouped the three Gippsland centres and given the averages, not because of the similarity of the soils at these places, but because of the similarity of their climatic environment. There is not much difference in the average performance of dressings Nos. 3, 6 and 7, but manuring at the rate of 6 cwt. super. per acre plus 1 cwt. sulphate of ammonia per acre has the advantage.

Table VII.—Average net Cash Increase per acre over No-manure Plots for three years 1923-24 to 1925-26, Central Highlands (Millbrook and Trentham).

	£	s.	d.
3 cwt. Super. per acre	27	4	3
6 cwt. Super. per acre	25	7	6
9 cwt. Super. per acre	23	10	9
6 cwt. Super., 1 cwt. Pot. Sulph. per acre ..	24	10	0
No Manure	..		
6 cwt. Super., 1 cwt. Amm. Sulph. per acre ..	27	8	6
6 cwt. Super., 1 cwt. Amm. Sulph., 1 cwt. Pot. Sulph. per acre	25	11	6
3 cwt. Market Garden Manure per acre	24	1	6
3 cwt. Basic Phos. per acre	22	6	3

In Table VII. Millbrook and Trentham average results have been grouped because the soil and climate at both places are practically the same. The results show clearly that the most suitable manurial dressing for these red volcanic soils is 3 cwt. superphosphate per acre.

It must be noted that in the case of all manures a substantial increase in monetary return was gained over the no manure plots. Where the manure applied approached the correct dressing, very substantial increases in the returns were obtained.

Table VIII.—Summary of Limed and Unlimed figures 1923-24, 1924-25, and 1925-26 from Millbrook, Trentham, Thorpdale, Catani and Korumburra.

	3 cwt. Super.	6 cwt. Super.	9 cwt. Super.	6 cwt. Super. and 1 cwt. Pot. Sulph.	No Manure.	6 cwt. Super. and 1 cwt. Amm. Sulph.	6 cwt. Super., 1 cwt. Amm. Sulph., and 1 cwt. Pot. Sulph.	3 cwt. Market Garden.	3 cwt. Basic Phos.
	C. q.	C. q.	C. q.	C. q.	C. q.	C. q.	C. q.	C. q.	C. q.
Total from Unlimed Plots	−17 3	−21 1	−22 2	− 3 3	−10 0	−23 0	−27 1	−31 1	−72 3
Total from Limed Plots	+15 0	+21 2	+ 9 3	+16 1	+18 2	+17 1	+28 2	+24 0	+ 0 0
Total Increase or Decrease for three years ..	+ 2 3	+ 0 1	−10 3	+12 2	+ 8 2	− 5 3	+ 1 1	− 7 1	−72 3
Average increase or decrease from all centres for three years	− 1 0	..	− 3 2	+14 0	+ 2 3	− 1 3	+ 0 1	− 2 1	−24 1

The lime figures are most informative. The results clearly indicate that, in the majority of cases, it is not only not profitable to apply lime to soil for the growth of potatoes, but that in many instances lime causes (under Victorian potato country conditions) an actual depression in the yield.

The complete figures for three years over nine manurial variations show that, in five cases out of the nine, depression of the yield was caused. In one case no appreciation or depreciation took place, and in only three cases did improvement result from liming. The total of

the depressions was almost twice that of the increase, and in only one case, viz., that where lime at the rate of 1 ton to the acre was used in conjunction with 6 cwt. super. and 1 cwt. sulphate of potash, did the increased weight warrant the cost of the lime application. From these results it is inadvisable to incur the fairly high expenditure—something over £2 per acre—involved by liming. These results are authentic. They have been carried out by the Department in a variety of soils in the various potato districts of this State, and through sufficient seasonal variation to make them of great value to potato-growers, and it is hoped that they will be studied by those interested to their benefit.

TABLE IX.—SHOWING (1) YIELDS FROM THE VARIOUS EXPERIMENTAL PLOTS FOR THE YEARS 1923-24, 1924-25, AND 1925-26; (2) THE AVERAGE YIELD AT EACH PLACE FOR THESE THREE YEARS; AND (3) THE INCREASE OR DECREASE IN YIELDS AS A RESULT OF THE APPLICATION OF LIME.

Year.	3 cwt. Super.	6 cwt. Super.	9 cwt. Super.	6 cwt. Super. and 1 cwt. Pot. Sulph.	No Manure.	6 cwt. Super. and 1 cwt. Amm. Sulph.	6 cwt. Super., 1 cwt. Amm. Sulph., and 1 cwt. Pot. Sulph.	3 cwt. Market Garden.	3 cwt. Basic Phos.
	T. c. q.	T. c. q.	T. c. q.	T. c. q.	T. c. q.	T. c. q.	T. c. q.	T. c. q.	T. c. q.
MILLBROOK, Unlimed.									
1923–24 ..	17 4 3	16 13 3	16 19 2	17 12 0	12 6 0	18 5 0	17 7 0	17 19 3	17 19 1
1924–25 ..	6 12 2	6 15 0	7 0 0	7 0 0	4 7 2	6 17 2	7 10 0	7 10 0	6 5 0
1925–26 ..	4 13 1	4 3 0	3 18 0	4 0 2	2 10 0	4 5 2	4 5 2	4 13 1	4 18 0
	28 10 2	27 11 3	27 17 2	28 12 2	19 3 2	29 8 0	29 2 2	30 3 0	29 2 1
Average ..	9 10 0	9 3 3	9 5 3	9 10 3	6 7 3	9 16 0	9 14 0	10 1 0	9 14 0
MILLBROOK, Limed.									
1923–24 ..	17 1 3	16 11 1	15 4 0	17 11 3	11 18 1	15 10 2	17 1 2	15 10 2	16 6 0
1924–25 ..	5 7 2	5 17 2	6 17 2	6 17 2	3 15 0	6 15 0	6 17 2	7 5 0	5 15 0
1925–26 ..	4 3 0	4 3 0	3 15 0	3 12 2	2 10 0	3 18 0	3 18 0	3 10 0	3 12 2
	26 12 1	26 11 3	25 16 2	28 1 2	18 3 1	26 3 2	27 17 0	26 5 2	25 13 2
Average ..	8 17 3	8 17 1	8 12 0	9 7 0	6 1 0	8 14 2	9 5 3	8 15 0	8 11 0
Decrease where lime applied	0 12 1	0 6 2	0 13 3	0 3 3	0 6 3	1 1 2	0 8 1	1 6 0	1 3 0
TRENTHAM, Unlimed.									
1923–24 ..	7 12 2	7 15 0	8 0 0	7 15 0	3 7 2	7 15 0	7 10 0	5 5 0	4 7 2
1924–25 ..	5 5 0	8 5 0	7 5 0	7 5 0	3 0 0	7 5 0	7 10 0	6 5 0	6 15 0
1925–26 ..	4 15 0	4 15 0	4 10 0	4 15 0	2 10 0	6 5 0	5 15 0	5 10 0	5 5 0
	20 12 2	20 15 0	19 15 0	19 15 0	8 17 2	21 5 0	20 15 0	17 0 0	16 7 2
Average ..	6 17 2	6 18 1	6 11 3	6 11 3	2 19 0	7 1 3	6 18 1	5 13 1	5 9 0
TRENTHAM, Limed.									
1923–24 ..	8 2 2	8 10 0	8 0 0	8 5 0	3 17 2	8 10 0	8 0 0	5 12 0	4 10 0
1924–25 ..	8 0 0	8 10 0	7 10 0	7 17 2	2 10 0	7 10 0	7 10 0	6 5 0	6 0 0
1925–26 ..	5 0 0	4 10 0	4 0 0	4 5 0	2 15 0	5 10 0	5 0 0	5 5 0	4 10 0
	21 2 2	21 10 0	19 10 0	20 7 2	9 2 2	21 10 0	20 10 0	17 2 0	15 0 0
Average ..	7 0 3	7 3 1	6 10 0	6 15 3	3 0 3	7 3 1	6 16 0	5 14 0	5 0 0
Increase or Decrease where lime applied	+0 3 1	+0 5 0	−0 1 3	+0 4 0	+0 1 3	+0 1 2	−0 2 1	+0 0 3	−0 9 0

Table IX.—(*continued*).

Year.	3 cwt. Super.	6 cwt. Super.	9 cwt. Super.	6 cwt. Super. and 1 cwt. Pot. Sulph.	No Manure.	6 cwt. Super. and 1 cwt. Amm. Sulph.	6 cwt. Super., 1 cwt. Amm. Sulph., and 1 cwt. Pot. Sulph.	3 cwt. Market Garden.	3 cwt. Basic Phos.
	T. c. q.	T. c. q.	T. c. q.	T. c. q.	T. c. q.	T. c. q.	T. c. q.	T. c. q.	T. c. q.
CATANI, Unlimed.									
1923–24 ..	7 19 2	8 5 0	9 0 0	8 12 2	4 7 2	10 10 0	12 2 0	5 12 2	7 2 2
1924–25 ..	3 7 0	4 12 0	5 6 0	2 15 0	2 5 0	6 11 0	5 17 0	4 4 0	3 17 0
1925–26 ..	7 15 0	8 10 0	10 12 2	9 0 0	5 0 0	11 10 0	11 10 0	8 15 0	11 15 0
	19 1 2	21 7 0	24 18 2	20 7 2	11 12 2	28 11 0	29 9 0	18 11 2	22 14 2
Average ..	6 7 0	7 2 1	8 6 0	6 15 3	3 17 2	9 10 1	9 19 3	6 3 3	7 11 2
CATANI, Limed.									
1923–24 ..	7 2 2	7 17 2	9 7 2	9 7 2	4 12 2	11 12 0	12 5 0	5 12 2	7 2 2
1924–25 ..	3 12 0	3 13 0	5 0 0	4 2 0	2 5 0	6 11 0	5 17 0	4 4 0	3 17 0
1925–26 ..	8 15 0	8 15 0	12 0 0	9 5 0	6 5 0	11 17 2	15 0 0	9 2 0	8 15 0
	19 9 2	20 5 0	26 7 2	22 14 2	13 2 2	30 0 2	33 2 0	19 18 2	19 14 2
Average ..	6 9 3	6 15 0	8 15 3	7 11 2	4 7 2	10 0 0	11 0 3	6 12 3	6 11 2
Increase or Decrease where lime applied	+0 2 3	−0 7 1	+0 9 3	+0 15 3	+0 10 0	+0 9 3	+1 1 0	+0 9 0	−1 0 0
THORPDALE, Unlimed.									
1923–24 ..	8 0 0	9 10 0	9 7 2	9 10 0	5 5 0	9 10 0	8 10 0	8 2 2	6 10 0
1924–25 ..	3 12 0	4 0 0	3 15 0	3 15 0	1 10 0	4 0 0	4 0 0	2 17 2	3 2 2
1925–26 ..	5 3 2	5 3 2	5 8 3	5 3 2	1 5 0	7 5 0	8 5 3	5 10 0	7 5 0
	16 15 2	18 13 2	18 11 1	18 8 2	8 0 0	20 15 0	20 15 3	16 10 0	16 17 2
Average ..	5 11 3	6 4 3	6 3 3	6 2 3	2 13 1	6 15 0	6 15 1	5 10 0	5 12 2
THORPDALE, Limed.									
1923–24 ..	9 15 0	11 10 0	10 0 0	10 0 0	6 0 0	8 0 0	8 5 0	10 5 0	6 0 0
1924–25 ..	3 15 0	4 5 0	3 15 0	4 0 0	1 10 0	3 15 0	4 0 0	3 15 0	3 5 0
1925–26 ..	4 13 0	5 8 3	4 13 0	4 18 1	1 10 0	6 5 2	5 10 3	4 13 0	4 13 0
	18 3 0	21 3 3	18 8 0	18 18 2	9 0 0	17 0 2	17 15 3	18 13 0	13 18 0
Average ..	6 1 0	7 1 1	6 2 3	6 6 0	3 0 0	5 13 2	5 18 2	6 4 1	4 12 2
Increase or Decrease where lime applied	+0 9 1	+0 16 2	−0 1 0	+0 3 1	+0 6 3	−0 1 2	−0 16 3	+0 14 1	−1 0 0
KORUMBURRA, Unlimed.									
1923–24 ..	11 5 0	12 10 0	12 0 0	11 7 2	6 15 0	13 11 0	12 10 0	7 17 2	7 17 2
1924–25 ..	3 10 0	3 15 0	3 15 0	3 0 0	1 10 0	3 18 0	4 5 0	3 0 0	3 0 0
1925–26 ..	7 0 0	7 10 0	6 5 0	7 10 0	3 10 0	7 0 0	7 0 0	5 0 0	4 15 0
	21 15 0	23 15 0	22 0 0	21 17 2	11 15 0	24 9 0	23 15 0	15 17 2	15 12 2
Average ..	7 5 0	7 18 1	7 6 3	7 5 3	3 18 1	8 3 0	7 15 0	5 5 3	5 4 0
KORUMBURRA, Limed.									
1923–24 ..	13 19 2	14 2 2	13 7 2	15 7 2	6 15 0	15 7 2	14 12 2	9 5 0	9 5 0
1924–25 ..	2 10 0	3 0 0	2 10 0	3 0 0	2 0 0	3 0 0	3 0 0	2 10 0	2 10 0
1925–26 ..	4 10 0	5 10 0	5 5 0	7 0 0	2 10 0	7 0 0	6 15 0	3 10 0	3 15 0
	20 19 2	22 12 2	21 2 2	25 7 2	11 5 0	25 7 2	24 7 2	15 5 0	15 10 0
Average ..	6 19 3	7 10 3	7 0 3	8 9 0	3 15 0	8 9 0	8 2 2	5 1 2	5 3 1
Increase or Decrease where lime applied	−0 5 1	−0 7 2	−0 6 0	+1 3 1	−0 3 1	+0 6 0	+0 7 2	−0 4 1	−0 0 3

COOL STORAGE OF WASHINGTON NAVEL ORANGES.

RESULTS OF 1926 EXPERIMENTS.

By G. B. Tindale, B.Ag.Sc.

Blue Mould and Green Mould.

Though oranges may be cool stored over a considerable period, it is only lately that storage has been carried out here to any extent. From time to time serious losses have occurred owing to the development of green mould (*Penicillium digitatum*) and blue mould (*Penicillium italicum*), and when cases of oranges are affected with either of these diseases, even the individual fruits not actually mouldy are frequently valueless on account of the tainted odour they absorb from the affected fruit.

Numerous investigators have proved that before mould can gain access to an orange there must be some wound, maybe only a very slight one, while, on the other hand, a sound skin offers complete protection against attack. Thus for the successful cool storage of oranges it is essential that they should sustain no injury while being picked and handled.

When oranges are freshly picked their skins are particularly turgid, and a very slight knock is sufficient to cause quite a deep bruise and the setting free of a considerable amount of moisture. Picking is, therefore, a task that calls for extreme care. Should oranges be sized and packed immediately after picking, the unavoidable knocks would cause serious injuries to the skin, and mould infection would be almost certain to result. Hence after picking they should be carefully removed to a shed (open for preference) for sweating. As the sweating period lasts some seven to ten days, the outer skin has by the end of that time lost some of its moisture, and becomes slightly leathery, and consequently more able to withstand slight knocks without bruising.

For the experiments carried out by the Department of Agriculture during 1926 oranges were secured from Mildura, Ballendella, and Cobram. The experiments were planned mainly with the object of showing how careful handling will prevent mould attack. Thirty-nine cases were obtained from Irymple, Mildura, from the grove of Mr. V. Roberts, where the soil is a red sandy loam, typical of the rises in that district. It was decided to make this experiment a sweating test as well. It was thought that by sweating in the open the process would be more efficient; also it was considered that it would be unwise to stack freshly picked oranges in a packing shed, where the atmosphere is generally badly contaminated with mould spores, and where even slightly bruised oranges would soon become infected.

The method of handling the fruit at the grove is detailed below:—

Table I.—Showing Date of Picking, etc., of Oranges at Irymple required for Experimental purposes (1926).

Lot.	No. of Cases.	Date of Picking, &c.	Place of Sweating.	Date and Place of Packing.	Period of Sweating.
A	10	Pulled 25.6.26 ..	Packing shed ..	8.7.26 at District Packing Shed	13 days
B	10	Clipped carefully 26.6.26	In open shed ..	7.7.26 at grove ..	11 days
C	10	Clipped carefully 29.6.26	On verandah ..	9.7.26 at grove ..	10 days
D	9	Clipped carefully 29.6.26	In open grove ..	8.7.26 at grove ..	9 days

Approximately equal proportions of fruit from certain trees were placed in each lot, and all were carefully picked. While the work was being carried out, it was observed that mould was very prevalent in the grove. Its development was favoured by heavy rains which had recently fallen, as well as by the dewy and foggy weather prevailing at the time. Split oranges on the trees were affected, as were fruits that had fallen to the ground.

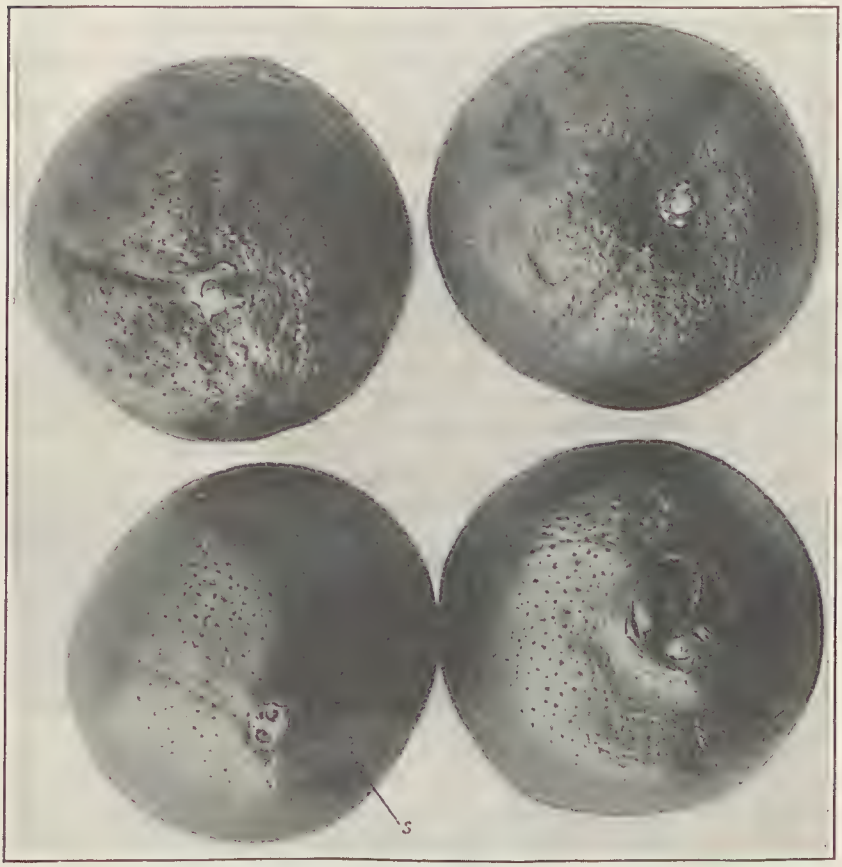
The oranges were all wrapped, and were placed in a commercial chamber at the Government Cool Stores, Melbourne, on the 16th July, the temperature being maintained at 33° F. They were first inspected after six weeks' storage, and not one mouldy orange was discovered in the whole consignment. However, there was a slight browning noticed on the skin of a few, and as it was thought that this was probably caused by the temperature being too low, the fruit was transferred to a chamber kept at 38° F. On the 15th September, seven cases were sent to the Royal Show, where they maintained their condition throughout the ten days of the Show.

Realizing the impracticability of sweating in the open, it was decided that the best course to adopt with the oranges required for the next experiment would be to sweat them in an open shed, where the wind had free access. Twenty cases of Washington Navels were secured from the grove of Messrs. Aitken and Son, Ballendella, where the soil is reddish loam. The oranges were carefully picked on the 27th July, and placed in paper-lined cases (to prevent injuries from splinters), which were then carted to an open shed, where the fruit was sweated for ten days, when it was graded and packed (ten cases being wrapped and ten unwrapped). The fruit was brought to the Cool Stores on the 11th August, and four cases (two wrapped and two unwrapped) were placed in chambers at each of the following temperatures:—32 deg., 34 deg., 36 deg., 38 deg., 40 deg. F.

The oranges were first inspected after two months' storage, when it was found that they were all in excellent condition, being quite free from mould and showing no sign of skin browning.

The third experiment was carried out with Cobram oranges from the grove of Mr. P. Quick, which is situated on a sandhill bordering the

Murray. These were carefully picked, sweated, and packed as before. They were picked on the 30th July, sweated for five days, and arrived at the Cool Store on the 6th August. The consignment consisted of six cases, and two cases (one wrapped and one unwrapped) were held at each of the following temperatures:—34 deg., 36 deg., 38 deg. After



Two Oranges badly affected with Browning or Spotting.

(Oranges cut across to show both upper and lower halves.)

Note how the browning originates around the button and extends downwards, following the creases in particular. Also how the lower halves are quite free from browning, except for large spot S. The browning along a crease is often terminated by such a spot.

two months' storage the oranges were examined and found to be quite free of mould, but the browning of the skin was very marked.

Seeing that the fruit in each consignment was still in excellent condition after two months' storage, it was decided to hold it for a longer period, as it was thought that some light might be thrown on the browning problem.

The Mildura oranges were kept until 1st October (eleven weeks' storage), when a final examination was made. It was noticed then that mould had made its appearance, while the browning of the skin had become worse. The following is the result of the examination:—

Table II.—Details of the Results from Holding a Consignment of Oranges from Mildura in Cold Storage for Eleven Weeks.

Lot.	No. of Cases.	Browning.		No. of Mouldy Fruit.	Average Mould per case.
		Slight.	Bad.		
A	8	112	78	50	6
B	8	104	81	12	1.5
C	8	104	50	13	1.5
D	8	94	64	24	3

In some instances the browning extended only over very small areas, and the oranges were not reduced in value. When the areas were sufficiently large to attract comment, though the flesh was quite sound, the fruit had little sale value, and in such cases the browning was classified as bad.

The Ballendella oranges were held until 15th November (three months' storage), when they were again examined, with the following result:—

Table III.—Details of the Condition of a Consignment of Oranges from Ballendella held in Storage for Three Months.

Temperature.	Loss of Weight.	Condition of Fruit.	
40 deg. unwrapped ..	3¾ lb.	Small nest of mould	No browning
,, ,, ..	3 lb.	No mould	,,
,, wrapped ..	2⅜ lb.	One mouldy orange	,,
,, ,, ..	2⅜ lb.	,, ,,	,,
38 deg. unwrapped ..	2⅞ lb.	No mould	,,
,, ,, ..	2½ lb.	,,	,,
,, wrapped ..	2⅛ lb.	,,	,,
,, ,, ..	3 lb.	One mouldy orange	,,
36 deg. unwrapped ..	3½ lb.	A nest of mould (6 mouldy oranges)	,,
,, ,, ..	3¼ lb.	No mould	,,
,, wrapped ..	2⅝ lb.	Two mouldy oranges	,,
,, ,, ..	2½ lb.	No mould	,,
34 deg. unwrapped ..	2 lb.	One mouldy orange	,,
,, ,, ..	1⅞ lb.	No mould	,,
,, wrapped ..	1½ lb.	,,	,,
,, ,, ..	1½ lb.	,,	,,
32 deg. unwrapped ..	2⅛ lb.	,,	,,
,, ,, ..	2 lb.	,,	,,
,, wrapped ..	1⅞ lb.	,,	,,
,, ,, ..	1¾ lb.	,,	,,

The loss of weight gives a very good indication of the condition of the fruit, the oranges held at the higher temperatures having become

somewhat soft, whilst those stored at lower temperatures were still very firm. The wrapping not only maintained the fruit in a firmer condition, but by keeping the sound oranges from the mouldy neighbours prevented the formation of mould nests.

It was also noticed that the oranges held at 32° F., and to a slight extent those at 34° F., were apparently breaking down, for the skins had become soft and "lifeless," in fact, one could easily push one's finger through them. Where the skins had broken down, they no longer offered any resistance to mould attack, and a few days after the removal of the oranges from the Cool Store nearly all of them had become mouldy.

It will be remembered that in the Mildura lot no signs of mould were disclosed until the second inspection. It was noticed then that in many instances the mould appeared in most cases in little sunken depressions, which were thought at the time to be the result of the mould attack. However, it seems most likely that these depressed spots were really a break-down of the skin, and that the mould then entered through such areas.

American cool-storage men do not generally store at temperatures below 40° F. It is difficult to trace their reason for this, but probably it is to minimize the chances of the break-down of the skin at low temperatures.

The Mildura consignment was held for six weeks at 33 degrees, and this period at such a temperature was probably sufficiently long to cause the skins to break down; the break-down, however, was but slight, and appeared only as spots. It was observed with the Ballendella lot that no breaking-down of the skins took place at 36 degrees and upwards; in fact, very little occurred at 34 degrees. From this it would seem that it is not desirable to store oranges at a temperature lower than 36 degrees.

The Cobram oranges were finally examined on the 11th November (after three months' storage). The condition of the fruit was then very bad. The brown areas were quite shrivelled up, and in many instances mould had penetrated such areas (especially where these had cracked open while shrivelling), and where the fruit was not wrapped nests of mould had developed.

Browning.

The browning and shrivelling were almost general in the Cobram oranges, and the following observations were made. They apply also to the Mildura lot, which, however, was but slightly affected:—

1. The browning was always most pronounced around the button, and usually extended down one side, but seldom affected the under side of the fruit. The affected area was more of a spotty nature than a general browning.

2. The browning frequently extended down from the button as "trickle" marks, and most frequently these occurred in the creases. The end of the "trickle" was usually marked by an extra large spot. On occasions, the "trickle" extended right under the orange into the navel, which became affected.

3. The less mature fruit, which had been sheltered by the foliage, was quite free from browning.

The effect was so striking that one could not help coming to the conclusion that the browning had been caused primarily by some liquid falling on the fruit while it was still on the tree. Injury due to spraying or fumigation immediately suggested themselves, but it was ascertained that the fruit had been neither sprayed nor fumigated.

Fawcett* states that a particular form of skin browning or spotting is due to the liberation of minute traces of oil from the oil cells of the skin, the oil apparently destroying the tissue with which it comes into contact. It has also been observed that oranges picked while there is moisture on the skin are liable to the browning. The results of last year's experiments seem to definitely confirm the observation that skin browning (which areas ultimately shrivel) is brought about by the oranges being picked during damp weather.

Reasons for suggesting that the picking of the oranges during damp weather is the cause of the skin browning are as follow:—

1. The Ballendella oranges were picked during the afternoon of a very dry day, and none of them developed browning.

2. The Mildura consignment was picked on mornings following heavy dews, and even light showers. The mornings were usually bright and shiny, and picking commenced when it was thought that the fruit had dried. This lot was but slightly affected.

3. The day previous to picking the Cobram oranges heavy rain fell. A bright sun the following morning had the effect of drying the fruit fairly rapidly, and so picking was commenced. However, at picking time it was noticed that in many instances there was moisture gathered round the button, and on some of the oranges there were still trickles of moisture. This lot was very badly affected.

4. The immature oranges were quite free from browning. These being sheltered by the foliage would not have been made wet by the rain.

Conclusions.

1. Washington Navel oranges may be kept in excellent condition in cool store for periods up to three months.

2. The best temperature for storage appears to be 36° F.

3. Blue mould and green mould are the greatest enemies of the orange in cool store and elsewhere. Careful handling during picking, sweating, and packing will prevent mould attack.

Picking.—Oranges should be harvested when they are just reaching maturity. They should be very carefully picked, so as to avoid injury to the skin. The stems should be removed close to the button. Finger nails of the picker should be trimmed very short, or gloves should be worn.

Sweating.—After picking, the oranges should be carefully placed (not tipped) into the cases, which, if rough, should be paper lined. The cases should be then carted on a well-sprung vehicle to an open shed for sweating. They should be stacked so as to allow the wind to freely circulate between them. After sweating for about a week to ten days, according to weather, the skins become more pliable, and hence are not so liable to be bruised.

* *Citrus Diseases and their Control:* H. S. Fawcett, p. 466.

Packing.—The oranges should be carefully rolled (not tipped) into the sizer, and then wrapped and packed according to methods shown on the departmental packing chart.

4. Skin spotting or browning with subsequent shrivelling is a serious blemish on oranges kept in cool store. The browning is not caused directly by cool-storage conditions, and all evidence points to the fact that it is due to the picking of the fruit while it is still moist. Therefore, growers should be careful to see that oranges are not picked unless they are perfectly dry.

In conclusion, I wish to thank the various growers concerned for their active help in carrying out the experiments.

PIGS FOR BACON.

By G. H. F. Baker (Broadcast through 3LO).

Why More Bacon is not Consumed.

It is popularly supposed that all breeds and cross-breeds of pigs are serviceable for bacon purposes, but that is not so. Some may produce the class of pork in keen demand, yet may not be serviceable, without the infusion of blood of some other breed, for the production of that kind of bacon eagerly sought by the curer, seller, and consumer, especially during the summer months, the time of the year when the public asks for a leaner quality of bacon than they like in the winter.

Whilst fashions and tastes alter in many things, there has been little change in the type of pigs reared in Australia, for to-day we are breeding pigs of the same conformation as those of many years ago, but every bacon-curer knows that the taste of our people for excessively fat bacon has changed, and the demand is now for an article that is mild cured, tender, lean, and juicy. And as it is a wise business proceeding to study and cater for the requirements of the consuming public, bacon pig-raisers will have to give more attention to the breeding and feeding of pigs if they are to meet the desire for the class of bacon now so much in favour.

Unfortunately for dairy-farmers, who, after all, are the principal pig-raisers here in Victoria, low prices are obtaining for milk, butter, and cheese, and many of them were looking to their pigs to make up the lee-way. There is, however, a slump in the price of pigs at the present moment*, partly due to the curers having secured their Christman requirements and partly to the lessened demand from consumers. This latter usually occurs with the approach of the warm weather, principally because we do not produce a lean enough quality of bacon to induce people to eat largely of it during the hot weather.

Many people will eat bacon and other pig products during cold weather, but they turn from them during hot spells. If a lighter, leaner, and more meaty pig were bred, there would not be this annual

* This lecture was delivered on the 15th November, 1926.

summer slump in prices, and there would be a regular, steady trade in bacon right through the year. That little attention has been given to the breeding of pigs suitable for the trade is very apparent on a visit to any pig market. There one sees all classes and conditions of pigs yarded, and whilst quite 75 per cent. of them are unsuited to trade requirements, there is not even then 25 per cent. of high class bacon animals. It is the commonness of unsuitable pigs that reduces both the price and the consumption of pig products in Victoria. If a high percentage of good quality bacon were obtainable, eggs and bacon would be on many breakfast tables daily, whereas now they are the exception rather than the rule.

Pigs of the type required must be bred. They cannot be produced by feeding, for there is no known method of feeding that will convert an unsuitable or mongrel bred pig into a high class bacon animal. In no other domestic animal is correct conformation and good breeding so valuable as in a pig, whether it be required for pork or bacon purposes. Without good breeding, economical results cannot be attained, and without correct conformation one cannot have that class of bacon eagerly sought by the consumer. Therefore, it behoves all those engaged in the pig industry to give very earnest attention to the selection of the male and female members of their stud.

Whilst many maintain that it is not absolutely necessary to have pure-bred sows in the studs of commercial pig-raisers, in actual practice it has been found that a cheaper and faster-growing animal of a more uniform type can be produced from pure-bred parents of two different breeds than will be the progeny from even good crossbreds.

Pigs coming from a long and undoubted lineage are more likely to re-produce an even line of pigs than those of unknown breeding. Moreover, they will give the best returns in a dressed carcass, for they will show less loss on account of offal than will the nondescripts. Many farmers hesitate to go to the expense of purchasing pure-bred animals, yet the expenditure is justified when the percentage of profit over cost of production is taken into consideration. Most of our pure-bred pigs have been bred pure and carefully selected for generations past for the sole purpose of the economical production of either pork or bacon. They can, therefore, show a greater bodily gain for a given weight of food than the mongrel-bred pig. But better commercial results are obtained by crossing two pure breeds of pigs for either pork or bacon purposes. By so doing, a more numerous litter is secured, the individuals of which will be bigger at birth and will grow quicker.

This cross-mating is usually between a boar of one of the larger breeds of pigs with a sow of one of the medium sized breeds. Such a cross will produce the type of bacon pig that is in keen demand to-day, for, as before stated, the needs of the curer and the consumer are not receiving that attention they deserve. Consequently, there are these periods of low prices which many state are due to over supply; that is not so, because, individually, we would be healthier if bacon formed a larger part of our diet; and if the tastes and requirements of the consumer were studied more closely, a greater amount of bacon would be consumed—much to the advantage of our pig-raisers, most of whom look to the pig to convert skim-milk and butter-milk into a readily marketable product.

The Ideal Bacon Pig.

The pig most sought after by our bacon curers is one whose live weight does not exceed 160 lb., and which will dress out a carcass weight of 120 lb.; such a carcass will cure two sides of bacon weighing round about 45 lb. The flesh must be firm and pink, the fat hard and white. What I may describe as the ideal bacon pig should have a neat, trim head, with a medium length of face, neat and trim also in the neck, have plenty of heart and lung room in the chest cavity, and neat, straight shoulders blending well with the back. The ribs must be well sprung from the backbone and dropped down vertically, giving a straight side that is in alignment with the shoulders and hams. The back must be strong and muscular and of the same width throughout, with a slight arch over the loins; the tail should be well set on and high up; the hams well filled inside and out, with the flesh tapering to the hocks. The belly should be firm and straight in the underline with the hind flanks full showing a thickness at that point. The pig should stand four square on clean, flat-boned legs and on his toes. The coat should be straight, fine, and abundant, and the animal should walk with a graceful, easy carriage. Pigs of this conformation will be found to weigh well at an early age, and they will have plenty of meat in the high price cuts. Their dressed weight will show a high percentage of their live weight. They will be thick in the bellies, the shoulders will be fine and light in comparison with the rest of the carcass, and the middles will be long and deep, and the hams shapely.

Generally there will be a high percentage of lean meat to fat, but the carcass should not carry more than an inch and a half of fat along the back, and there must be an even distribution of streaky fat throughout the middle. Pigs of this character can be got by careful breeding, but it is regrettable to have to state that only a small percentage of those raised in Victoria are of this desirable conformation. Far too many are short and thick in the body, coarse in the head and bone, wrinkly in the skin, shieldy in the shoulder, and curly in the coat. Others are long in the head and body, coarse in the shoulders, narrow behind the shoulders, and light or shallow in the middle, and are also poor in the hams, and have coarse coats. It is impossible to make good sides of bacon from such animals, which fill the place of better pigs and, moreover, drag down the price of the better bred, more shapely pig, as well as lessen the consumption of bacon. My advice to farmers is—get better stock and breed better pigs.

Fortunately, Victoria has many breeders of pigs of the right conformation and of undoubted lineage, which, if only more generally used, would make the standard of our pig products equal to that of any other part of the world. It is our duty to set about preparing for the day when we shall compete with other countries on the English market, for England to-day consumes something like £70,000,000 worth of imported pig products; but very little of it comes from Australia. There is no excuse for our not exporting more, for the right class of pedigreed pigs are to be found here, a suitable climate, and an ample food supply. In fact, we have everything necessary for the economical successful raising of pigs, but a better selection of foundation stock of the right class must become more general.

The Boar.

Extreme care and judgment should be exercised in the selection of the boar, as he has a great influence on the size and number of the litters born to him, as well as exerting a great influence on the conformation of the little piglings. He must come from an even line of pigs, be of undoubted pure breeding from prolific parents, of correct conformation, and free from the imperfections found in most pigs. He should be preferably one of the larger kinds of pigs, and whilst he must be a well grown specimen of the breed he represents, he must not be a coarse, gross pig. Such a one seldom gives satisfaction for any length of time, and will invariably fall into heavy flesh and fat, and become savage and unreliable. He must have a masculine appearance, a fine head with a neat, well fleshed jowl, full bright eye, broad in the forehead and poll, and have good quality ears, well carried; neck of medium length and muscular. He should be free from a crest or pad of fat on the top of the neck, and must be wide and deep in the chest cavity—a quality denoting that there is plenty of heart and lung room. The shoulders should be fine and straight, for an oblique shoulder makes for a fore-shortened body. There should be a good width between the forelegs, and the shoulders should be compact on the top, and in perfect alignment with the ribs and ham. The body must be full behind the shoulders; the ribs, well sprung from the backbone, should drop down sharply, giving a flat side. The back should be strong and slightly arched over the loins. A weak or hollow back is very objectionable, and a pig with this defect should not be used. The back should be broad and uniform throughout, muscular and firm, and no segments of the backbone should be discernable to the touch. The ham, too, should be muscular both inside and out, and should taper down to the hock, but not wrinkle over the joint; the bone should be clean and flat. The animal should have plenty of width between the hind feet and should stand on his toes, and any departure from this should be regarded as a defect. The tail should be well set on and carried high, and the shoulders free from shield and the skin from wrinkles. The hair should be abundant, fine, straight, and silky, as course or curly-coated pigs are not desirable stud animals. A boar must have a good underline, and the hind flank should be full and meaty. He should walk with an easy, graceful carriage and an "aristocratic" air. A swaying, waddling pig, or one down on his pasterns, or one with coarse bone, bent knees, and sickle hocks should be avoided.

The Sow.

In selecting the sow due regard should be paid to docility, for this characteristic is particularly valuable in a pig. Quiet, contented parents make for contentment in their progeny. She should be built on much the same lines as the boar, only, of course, finer. A breeding sow should have at least twelve even-spaced teats, and only in the case of a very long-bodied animal should there be more than fourteen, as more than that number means that they are too closely spaced, which will lead to quarrelling amongst the litter at nursing time. She should be big and roomy, as it is only from big parents that big litters of fast and

economical growing pigs are raised. She must be neat and trim and show no paunchiness or general looseness, and be of an active, sprightly disposition. Dull, listless sows are careless mothers and are rarely prepotent.

Both parents should come from heavy milk yielding families.

All breeding stock should be kept in good condition, for it is only from well nourished animals that we can expect well nourished, lusty litters. The idea that brood sows should not be allowed to get into good condition is wrong; the best results cannot be expected from half-starved sows.

Care of the Young Pigs.

The litters must be well fed at all times, for there should be no check in their growth from birth to maturity, and in this direction they should be encouraged to take some nourishment, apart from their mother's milk, at as early a period in their life as possible, usually when they are three (3) weeks old.

A little low, shallow trough should be provided for them in a small yard adjoining the breed pen, protected by a low gateway through which the sow cannot pass. It will be found that they will go to this trough several times daily and take just sufficient nourishment to keep them growing fast.

Allow the young pigs to suckle their mother for at least eight weeks, better still 10 weeks. Many sows will wean their young at eight weeks. Never remove the little chaps from familiar surroundings, if it is at all possible not to do so. Of course, in the event of the sale of them as suckers this must be done. Little pigs fret more for familiar surroundings than they do for the parent that reared them.

After weaning, permit the young pigs to go out grazing in the pig paddocks with the older animals, and they then get green food and exercise, which is essential to their well-being and rapid growth. They should be kept growing and fattening until they reach a live weight of 160 lb., which should be attained at from five to six months.

When they have attained the weight of 160 lb., they should be marketed. Before despatching them to market give them a wash, and either grease or oil them. This considerably improves their appearance and makes a good impression on the buyer.

Pigs should never be fire-branded if it can possibly be avoided, as it will mean a permanent disfigurement, and one which cannot be removed during the scalding and scraping of the carcass; its value is thus lowered. If, for some good reason, a farmer wishes to brand his pigs, the operation should be done on the neck, for this part is removed from the side during slaughter, and consequently the side is not disfigured. Ear-marking would be a far better means of identification.

Two litters a year should be raised. Breeding operations should be so arranged that the young ones will be fit to sell during those periods of the year when prices are best, and a farmer must always be on his guard against marketing his pigs when prices are falling.

As a parting piece of advice, let me urge my hearers once again to raise a high-class type of pigs that will yield tasty bacon and ham of a quality that will become more and more popular with consumers.

PLANT PATHOLOGY.

STUDIES IN EUROPE AND AMERICA.*

(Continued from page 6.)

By D. B. Adam, B.Agr.Sc., Plant Pathologist.

(2) The Potato Degeneration Diseases and Seed Certification.

The tendency to degeneration in potatoes has been known for many years. This knowledge is reflected in the very old world-wide practice of securing "seed" from certain districts which generally are cooler than the place in which the crop is to be grown. Many theories have been proposed as to the actual cause of degeneration, some seeing in continued vegetative propagation a sufficient reason for loss of vitality —hence degeneration.

A more satisfactory explanation has been found in the presence of fairly well-defined diseases in degenerated potato plants.

In 1911, Professor W. A. Orton, of America, observed in Germany a condition in potatoes in which the leaves developed a mottled appearance. A disease of similar appearance called mosaic disease had long been known to affect tobacco, and hence that term was applied to the disease in potatoes. About the same time a number of Dutch workers, including Dr. Quanjer, whom the writer met, were devoting their attention to the problem of potato degeneration in Holland, most of which it was found could be ascribed to one or other of a group of degeneration, or so-called virus diseases. The term virus disease is applied to a group of infectious diseases, the causes of which are obscure.

Generally, but not always, these diseases are characterized by a dwarfing and a yellowing, more or less distinct, of some part of the plant, and by a diminished yield of marketable tubers, due to a reduction of their size or number. Reduction in yield reported in the United States of America varies from 5 to 30 per cent., while in Bermuda it is reported that mosaic of potatoes frequently causes a loss of from 10 to 75 per cent. In New Brunswick, Canada, it was concluded that the yield is reduced about one and one-fifth bushels for every 1 per cent. of mosaic present. The writer has since his return seen a field of potatoes where conditions for the increase and perpetuation of mosaic diseases were very favorable. Counts made showed that from 72 to 96 per cent. of mosaic disease was present, an average of 80 per cent. over the whole field, which, if we accept the Canadian figure as of local application, would mean a reduction of 96 bushels per acre. The damage, however, was so extensive and obvious that the farmer concerned ploughed up the half-grown crop.

The group of diseases has been split up, mainly on the basis of symptoms, into a number of diseases, to some of which names, such as mosaic, crinkle, streak, spindling tuber, leaf roll have been given. Some authorities distinguish ten or a dozen of these diseases in the potato. The matter of determining these diseases and comparing them with others found elsewhere is very difficult. Sometimes the same virus when used to inoculate potatoes under one set of conditions will

* Report on investigational work in England, Europe, and United States of America. The first part of Mr. Adam's report was printed in this *Journal* for January last.

produce certain symptoms, whereas if the disease is produced in potatoes in another locality the symptoms may be quite different, even to the point of being entirely masked. Again, two varieties may respond in a different way when inoculated with sap from the same affected vine. The difficulty of comparing two diseases, the diagnosis of which depends on the appearance of certain symptoms so uncertainly developed, is quite obvious. There are at least two main types of diseases which tend, however, to merge into one another—

1. The mosaic group.
2. Leaf roll.

1. The Mosaic Group.

The diseased plants are generally dwarfed and mottled. With some forms the leaves are curled and ruffled; with others they are rolled at the edge. In America it has been shown experimentally that a sufficiently high temperature will mask the mottling symptoms. In some forms of mosaic the size of the tubers is little affected, though in certain of the severer forms they are markedly reduced in size, and in such forms the stems tend to be brittle and streaked. Plants affected with mosaic yield about two-thirds as much as do healthy plants, a variation depending on the severity of infection. There is a considerable variation in the susceptibility of different varieties of potato to mosaic.

2. Leaf Roll.

2. Leaf roll is of considerable economic importance. Determination from many New York State fields indicates a loss of more than 60 per cent. from this disease. Affected plants usually are dwarfed; in those badly affected this is very pronounced. The stalks have a tendency to remain upright throughout the life of the plant. The leaf stalks are more upright, and produce an impression of starkness, though during early stages of infection this is not noticed. The leaves tend to roll upward, and the terminal ones become spoon-shaped or, where the symptoms are more intense, funnel-shaped. Sometimes only the lower leaves show this rolling. These rolled leaflets, especially the lower ones, are thicker than normal, have a leathery texture, and rattle when shaken. The seed pieces of affected plants may usually be found intact. Ordinarily the tubers produced are smaller and fewer. Usually, affected tubers show no internal or external discoloration; those from leaf roll plants may produce spindling sprouts or "thready" eye.

The virus of these diseases probably penetrates to all parts of the plants, except to the true seeds. If infection occurs during the growing season, only the young growth made subsequently will show symptoms; so that if there is no infection till after the plant is full grown, no symptoms may be present; yet the tubers will be affected and able to carry over the disease to the young plant. The virus takes an appreciable time to penetrate the whole plant. Is the process of using immature potatoes for seed purposes, which is known to be a remunerative practice in Victoria, unconsciously a means of obtaining seed relatively freer from degeneration diseases than is mature seed?

Transmission of Degeneration Diseases.

Research in various parts of the world has shown that most of the natural dissemination of these degeneration diseases is effected by suck-

ing insects, particularly aphides, there being little or no evidence of any soil transmission. Thus, if these certain insects, after sucking the juice of mosaic plants, visit a healthy one, they are liable to spread the disease. The discovery of this new role for aphides is of great importance in controlling the spread of these diseases, and in establishing an intelligent system of "seed" selection.

"Seed" Selection.

The value of using good seed for crops of all descriptions is well recognized. The task of the potato-seed-grower is among the most difficult, but on account of the greatly enhanced yields from good seed, where his results are satisfactory, there has been a steady demand for his produce.

In England and America, it has long been the custom for the southern growers, living in a warmer climate, to obtain their seed from northern growers. In the light of our present knowledge, the reason for this seems to be that in those northern colder climates, the transmitting agents, i.e., the insects, are controlled by natural conditions, whereas in the warmer southern areas they are more abundant, and through their activities so rapidly spread these degeneration diseases, that in a few years the "seed" produces poor, unprofitable plants.

Potato seed selection aims at obtaining seed from vigorous plants, true to type, of varietal purity and free from disease. This freedom from disease, especially degeneration disease, and how it is obtained and maintained in a stock of "seed" potatoes, particularly concerns us here.

The first necessity is to obtain tubers from a plant or number of plants known to be free from degeneration diseases. This can be done either by growing plants from true seed, since apparently the virus of these diseases does not penetrate the seed, or else by using individual tubers obtained from healthy plants. The seed should be sown under conditions favorable to the development of the disease, and plants remaining free from symptoms of disease should be selected. The burst of success which often accompanies the introduction of a new potato variety is probably in part due to the freedom of the stock from degeneration diseases, its subsequent decline concurring with the progressive infection of stocks with degeneration diseases. The maintenance of stocks free from disease demands that either the transmission agents or the disease source be eliminated. In practice the latter is attempted.

"Seed" Certification in America.

To take speculative risks that can be avoided is unbusinesslike. The southern potato-grower cannot afford to plant any seed that may be available. He is willing to pay and does pay more for "seed" which he knows has been subjected to a certain inspection and conforms to a description found on a tag issued by a reliable authority. Because of the value added to their stocks, seed-growers apply for inspection, abide by certain rules, and pay a fee to cover the cost of inspection and certification. In Minnesota the certificates are issued by the State Department of Agriculture, while in New York State, though an association of potato-growers issues the certificates and attends to clerical details, the inspection is supervised by members of the Experiment Station staff. Somewhat similar systems exist in other northern

States where certified seed is grown. The rules and regulations under which the potatoes in Minnesota are inspected may be given as showing the general rules in practice:—

"Every grower having his seed potatoes inspected is required to grow an isolated seed plot each year. This seed plot should be at least 10 rods from the nearest potato field. New applicants should secure their seed potatoes from a grower who maintains a seed plot, unless they have grown their own seed plot. The maintenance and proper care of an isolated seed plot each year is a means of securing pure, vigorous, disease-free seed potatoes for the field intended for certification, and lessens to a large degree the chances of rejection. A seed plot properly cared for is also a means of maintaining foundation stock for certification. This is especially important with the Bliss Triumph on account of the prevalence of mosaic in this variety. It is strongly recommended that such a seed plot be maintained from hill selected stock.

All potatoes certified by the State Department of Agriculture are given two field inspections. Tags are issued to the growers for attachment to sacks. These tags are an indication that the potatoes have met the field inspection requirements. On the reverse side of the tag is a summary of the Minnesota certified seed grade requirements. Every car of certified seed potatoes must be inspected for grade before it leaves the State. Every car inspected will have a card tacked on the inside wall of the car as a record that proper inspection has been made. A grading inspection certificate containing a detailed report of the inspection is then issued to the grower, and a copy sent to the purchaser on request.

Inspections.

Object: To obtain the following information:—

Stand: Freedom from disease.
General vigour: Freedom from insect injury.
Varietal purity: Trueness to type.
Number: Two field and one grading inspection are made.

First field inspection is made at flowering time. Second field inspection is made about a month later to check up on the presence of mixtures, diseases, &c. Third inspection is made at the time the potatoes are shipped.

Stand: A large number of missing hills shall be cause for rejection if due to diseases.

General Vigour: Potatoes will not be eligible for certification if the field contains more than 3 per cent. weak plants.

Varietal Purity: Fields containing any varietal mixture at the time of first inspection will not be eligible for certification unless all foreign varieties are removed by the grower under the direction of an inspector. A field containing more than 2 per cent. varietal mixture will not be eligible for certification under any circumstances."

Freedom from Disease.

The following percentages of disease will disqualify seed stock for certification at the field inspections:—

Vine Diseases.	First Inspection.	Second Inspection.
	per cent.	per cent.
Mosaic	5	3
Leaf roll	2	1
Spindle tuber	2	1
Yellow Dwarf	1	1
Streak	1	1
All combined	5	3
Wilt diseases	2	0
Blackleg	2	0
Rhizoctonia (record presence)		
Weak plants	3	1
Varietal mixtures	2	0
Late blight	0	0
Giant Hills	1	0

"If any of the diseases are present in a field in amounts less than the tolerance indicated, the infected plants must be removed before the second inspection. Diseased plants should be removed and destroyed as soon as possible after the first inspection, before tuber formation takes place. If tubers are formed, they must be removed. The early removal of diseased plants will aid greatly in preventing the spread of diseases to healthy plants.

A field under inspection must be free of weeds and serious insect injury. Excessive amounts of weeds and serious insect injury will disqualify a field.

Certain weeds such as nightshade and wild rose are important in the dissemination of the mosaic disease."

For the information of potato-growers, the Minnesota State Department of Agriculture published a bulletin giving these rules, and also a list of growers, with the acreage and variety they grow.

In 1925, with fields averaging about 9 acres, 4,664 acres were inspected, and of this area 75 per cent. finally passed the inspections.

Apart from methods of good farming, what special methods must be employed to grow certifiable seed?

1. The Seed Plot.

(*a*) *Seed Source.*—The seed source is exceedingly important. Minnesota authorities recommend that seed be obtained from hill selected stock, i.e., from tubers selected from healthy plants in the field. For reasons mentioned earlier, late infections, &c., may take place, and so absolute freedom from degeneration diseases is sometimes unobtainable in this way, the freedom being proportional apparently to the chance of late infection.

In Wisconsin the Experiment Station has assisted growers in obtaining foundation stocks by a system of tuber indexing. This system consists in removing one eye from a tuber, marking the pot in which it is planted, and the remaining tuber with the same number. The piece is planted a month or six weeks before sowing time for the main crop, and is grown in a glass-house under suitable conditions. Young growth is examined for symptoms of disease, its presence warranting the discard for seed purposes of the corresponding tuber. The quantities that can be dealt with in this way are, of course, necessarily limited, and the method can only be justified where the greatest possible care is taken by isolating the plot and roguing, i.e., eliminating diseased plants, to preserve freedom from disease.

The principle seems to be capable of easier application in our more congenial climate.

(*b*) *Isolation of Plot.*—These diseases are not due simply to biting by aphides; the aphides must carry the infective principle, and this can be obtained only from diseased plants. In Minnesota an isolation of 10 rods from all other potatoes is considered enough.

(*c*) *Roguing.*—Roguing is done by going through a crop three or four times during its growth, and removing any plants that show symptoms, thus eliminating disease sources within the plot.

2. The Bulk Plot.

The seed is obtained, of course, from last year's seed plot, so that roguing is the main operation requiring attention.

Many districts in Victoria are so well equipped climatically to grow seed potatoes, and the benefits to be derived by the grower himself, by his customers, and by the community generally from a system of seed certification are so great that direction of attention to the problem seems to be well worth while.

(*To be continued.*)

GRADING LAND FOR LUCERNE.

An Address by L. C. Bartels, B. Ag. Sc., Senior Irrigation Officer, broadcast through 3LO.

Lucerne requires a relatively large quantity of moisture for its development. It will surprise most people to know that under field conditions, about 600 tons of water, including the rainfall, is used in the production of 1 ton of lucerne hay. Of course, we find good lucerne growing in many places without irrigation, but this is usually on river flats or in localities where there is subsoil water available at the right depth. Curiously enough, while so much water is essential for its best growth, it is a great drought-resister and will not endure excess moisture.

Lucerne does not flourish in humid districts. In relatively dry and warm areas under irrigation it thrives, and because it is such a high class fodder-crop, productive, nutritious, and long lived, it is eminently suited for sowing in irrigated land, consequently lucerne culture is the basis of development in many of our settlements.

Since water is such a big factor in lucerne production it is obvious that its proper application to the land under irrigation is very important. The obtaining of best results from watering depends on the preparation of the land, the method of application, and on the man with the shovel.

The aim of the irrigator should be to effect an even distribution of water and to do it with as little trouble to himself as possible. If land were not prepared, it can be imagined what would happen when irrigation water was released on it. If the water could be made to cover the land, as it might under favorable conditions, it would be only by extra labour, and then the depressions would receive excess water and the bumps would not be wetted enough. When grading is done, the water may be easily and uniformly distributed, and there will be a minimum of waste.

The cost of good grading will be repaid over and over again, but indifferent preparation will be attended by increased cost of production

owing to waste of water, extra labour and uneven and poor crops. Grading land is sometimes wrongly spoken of as levelling land. It is really the reduction of land to a plane surface, which will have more or less slope according to the conditions. It would not be desirable to have the soil surface flat.

Grading involves the removal of bumps and ridges which would interfere with the spreading of water, and the filling of the depressions where water would collect. In the case of lucerne particularly such conditions would be very detrimental.

The first thing to do, then, is to determine where the rises and depressions are. This is often done by a contour survey. The blocks on our closer settlement areas have been surveyed, and information regarding slopes, &c., is available to the settler. When a more detailed survey is necessary, a field is marked off into squares of, say, half a

A Buckboard in use on the Swan Hill Flats.

chain in the fashion of a chess board. A dumpy level is set up and the levels of the land at the pegs is determined. These levels are plotted on a plan of the field, and lines are drawn connecting those points of similar levels, making contour lines. If the land slopes evenly they will appear as concentric lines; if there is an even slope in one direction only, they will be roughly parallel.

A better idea of contours may be had by visualizing land sloping into still water. The water is at the one level, and so at the junction of land and water we have a contour line. Imagine the water level to be raised in successive 6-inch rises; the different lines of junction would represent 6-inch contours of that sloping land. Therefore, a contour survey gives guidances in regard to the grading of the land, and one can determine the location of the bumps from which the soil may be scraped to fill the depressions.

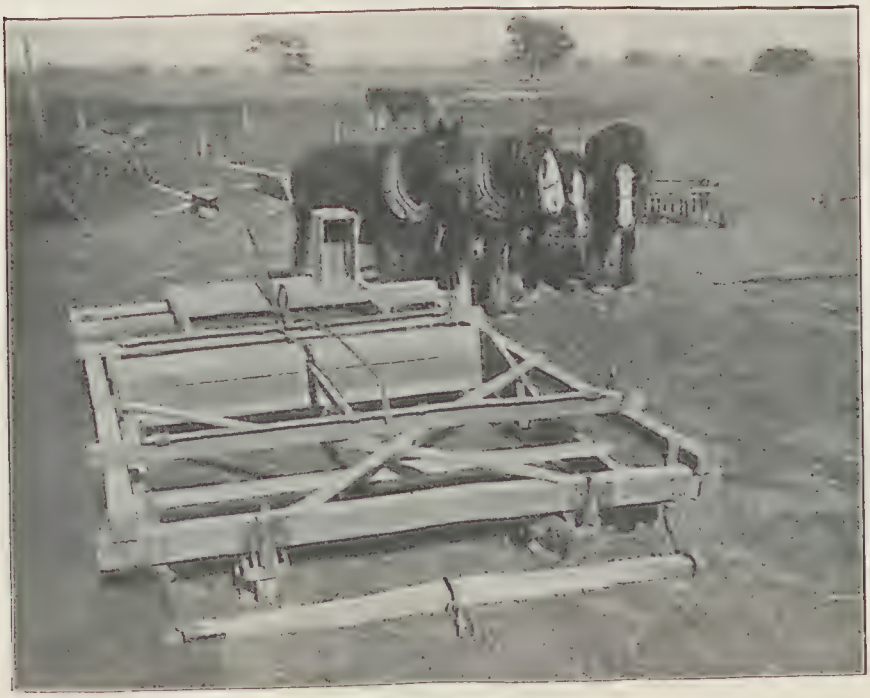
There are several systems of irrigation by which water is applied to land. Broadly they are divided into the flooding systems, furrow systems, and spray systems. Although there are cases—e.g., where water is very scarce—in which the furrow system may be used to irrigate lucerne, it need not be considered now. Lucerne is usually flooded—that means the water is poured out to cover the surface of the soil. In what is called wild flooding (the system requiring the least preparation of the land) the water is supplied from channels placed parallel at intervals or in positions conforming to the contours, and the land is flooded with sheets of water which overlap as they flow down the slopes.

An Improved Buckboard at Nanneella.

A variation of this method is to guide the water over a field by numerous small channels.

The lateral channels in the field may be placed at right angles to the greatest slopes or the field channels may run down the steepest slope. In this latter case the water is turned out by checking the water at intervals and it spreads laterally and also down the slope, parallel with the channels. Where the slope is excessive the water will not spread much. Of course the field channels may be put in an intermediate position; this helps to get over the difficulty that arises when slopes are too steep.

The border system so called is an improvement on the other method. It is the one in general use on the settlements for lucerne irrigation. The land is shaped into long narrow bays, which extend down the slope. These bays are separated by parallel checkbanks which confine the water. Each bay has to be level from side to side, and so careful smoothing is necessary. The size of the bays, which should have a uniform slope along their length, will depend on the texture of the soil, the slope and the head of water that can be used. In porous soils there is waste through excessive percolation at the head of the bay while the water is travelling to the end; therefore the bays must be short and relatively narrow. Where the grades are level, or the bays have what is called a flat grade, they should not be very long, but if there



A Useful Type of Grader.

is a big fall in the land, the water runs down the slope rapidly and long bays may be necessary to secure sufficient penetration.

The width of the bays is determined mainly by the sidefall. If there is a pronounced slope to the side as well as down the direction of greatest slope, narrow bays are preferable. Less shifting of earth is then required to make the bays level transversely, but it has to be remembered that while check banks facilitate watering, they are more or less an obstruction to implements, and so it is not usual to construct more of them than necessary.

If the fall of the land is too great the checkbanks may be run diagonally across the directions of greatest slope; this involves shifting more earth.

Preparations for Lucerne Planting.

If the area intended for lucerne is virgin land, it is not always advisable to sow lucerne as the first crop; it is better to grow, say, a cereal after a preliminary grading; later, when the land has settled and there is a chance that the levels obtained by grading will be maintained, lucerne may be sown.

I cannot emphasize too strongly the importance of proper preparation of the soil for lucerne. Because it is such a valuable crop, and because it will repay all the attention if receives, it deserves a good start. With proper treatment it will last for years, but the condition of the stand during its life will reflect the preparation made at the beginning.

It is remarkable that the farmers who are prepared to fallow for wheat or oats begrudge a similar preparation of the soil for lucerne.

Another View of the Grader.

The Implements Required.

Best conditions are achieved by ploughing the paddock in lands—not round and round—and leaving it lie in bare fallow for a period. It should be cultivated to a fair tilth, i.e., without any big lumps, although it should not be too fine before grading. If the ground surface is irregular, the preliminary grading is best done with what is called a buckboard or a buckscraper. The grader is then used to level the land, after which the position of the checkbanks is marked by forming a crown with a single furrow plow. The position of these checkbanks is determined by the considerations I have mentioned; usually they are put from one-half chain to a chain apart.

Too much care cannot be given to the preparation of the checkbanks. They have to last for years, and if they are not well constructed at the start, they will not properly control the distribution of water, and imperfect banks will increase the difficulty of applying water.

The banks are built up by taking a scraping of earth from the surface of the soil. Sometimes this is accomplished by the use of a crowder —a structure made up of two wide boards each 10 feet long, from 6 to 9 inches wide, and from 2 to 3 inches thick. These are placed on edge and inclined to each other like the sides of a V, but at the narrow ends the boards do not approach within about 2 feet 6 inches of each other. The pieces or bows across the top hold them in position. The wider portion is the front. As it is drawn along straddling the checkbank, it gathers earth from its full width, but leaves it as a narrow bank. It is plain that with this implement the area from which the earth is gathered is limited. It is more satisfactory to gather the earth transversely. In this way by having regard to sidefall the bay may be levelled, too, because earth is gathered only from the higher side, and some filling of the lower side of the bay may be accomplished at the same time.

Implements used for grading include the simple buckboard, the buckscraper, the slicker, and the more elaborate grading machines of various makes, the road grader, &c.

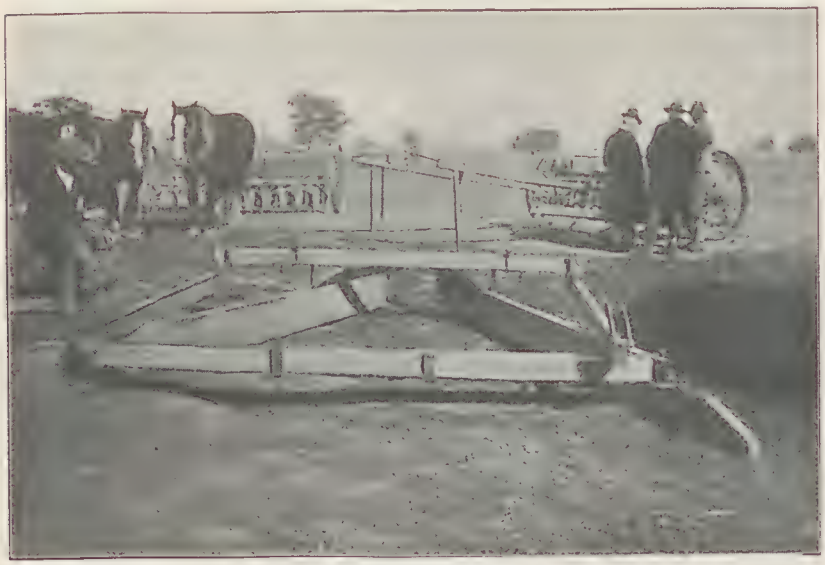
The buckboard is simply a flat board 2 inches thick, varying in width from 10 to 21 inches and from 6 to 8 feet in length. It is shod with iron on the bottom edge, which is usually bevelled. It is a scraper, and when in operation the amount of paring it does depends on the angle at which it is held. This is governed by a long handle to which a rope is affixed. When the handle is pulled down the scraper bites into the ground and gathers earth. When the board is vertical it rides on the surface of the ground, but it will push a considerable bulk of earth in front of it. When the top edges of the board is allowed to incline foward, the earth begins to slip from beneath. It may be dropped suddenly at any desired place by releasing the handle so that the board rides on its face. It may be pulled back to its cutting position by the rope affixed to the handle. This is a simple implement, not very costly, and any farmer, after a little experience, will do good work with it. With hoops or rounded bands of iron like a bow on the front ends of the board, the tumbling of the board is more easily controlled.

The buckscraper is a big scoop. It may be wholly of iron, or it may be partly wooden, but the front edge must be of iron. It generally is fitted with iron bows at the end and iron skids beneath. It is a most useful implement and in the hands of a skilled operator large quantities of soil may be transported for the levelling of the land, for the building of checkbanks or for filling channels. Its action is controlled by one long handle, and the bite it makes and the rate at which it drops its load are determined by the position of the handle.

The slicker is another rather simple implement, which has done good work. It consists of three long hardwood or oregon boards, 2 inches thick 10 inches wide and about 10 feet long. Imagine these three boards, placed on edge alongside about a foot apart. The back one is vertical. The top edge of the front one is inclined backwards, and the top edge of the middle one is inclined forward. In the slicker the three boards are joined in that position, and are shod with iron. The implement is drawn by four horses—two at each end. The bottom of the front board is the cutting edge, and when it is pressed into the ground it scrapes the surface and transports it in front. When it is lifted it drops the earth it is pushing, gradually or quickly according to the

height it is raised. This slicker is operated by the driver, who stands on a long board or platform, placed across the implement. When he is on front the slicker gathers earth; when he is at the back the leverage lifts the front. His position at the back determines whether the lift is much or little.

An advance on these simpler grading implements are the louvred graders, which have a long framework with cross pieces arranged louvre fashion. The better types have a cutting blade or iron-shod board across the middle. This board can be raised or lowered by a handle, and in this way its action is controlled; a thin paring or a big bite of soil may be taken, and the earth can be dropped gradually or quickly. These graders, which have length from front to back, have a more or less automatic action; when levelling is the work in hand they scrape



A "V" Crowder.

the small bumps and fill the hollows, whereas smaller scrapers go in and out of the depressions.

A very useful machine where a lot of grading has to be done is the road grader. At the State Research Farm and the Metropolitan Farm, Werribee, this machine is widely employed. In charge of a skilled operator very neat work is performed with it.

At the State Research Farm the border system of irrigation is followed almost entirely. Earlier the check system was the one in use, that is to say, the land was formed into squares and rectangular basins by cross checkbanks, but this method has now been abandoned. The bays at the farm are from 5 to 15 chains long, with a width of 44 feet, where the sidefall is not too great. Fortunately, over the greater area of the irrigable land slopes are favorable. Lateral channels run at right angles to the main supply channel, and so they conform to fence lines.

The border system is the one adopted generally. In places like Bacchus Marsh, where there is a great depth of soil, it is practicable to shift more earth in the grading process than is the case in the Goulburn Valley, and when smoothing is accomplished fewer checkbanks are necessary. An exception to the general rule is Cohuna, where one finds the distributing channels running down the slopes at relatively close intervals and crossbanks are common; but I cannot see why the border system could not be more advantageously used.

I shall conclude my talk on grading land for lucerne with a plea to the lucerne grower for care in the preparation of land for irrigation. He should not undervalue the importance of proper smoothing. He may save money at the start by not thoroughly finishing the job, but he will have recurring expense by the loss of time, labour, water, and crops. A great mistake often made is that the important work of grading may be deferred till later.

I appreciate the difficulties that many settlers are under, but thoroughness in the work of grading will be fully repaid.

THE FARM GARDEN.

A. Jones, Orchard Supervisor.—Broadcast through 3LO.

A good farm garden planted with ornamental shrubs and trees makes the home more attractive, and, at the same time, enhances the value of the property.

Fruit and vegetables should be grown on every farm, for they will not only mean an important saving in the cost of feeding the family, but form a most palatable and healthful part of a well-balanced diet.

Fruit just gathered from the garden is better in quality and flavour and often far superior as food to any which may be purchased at a market or store.

Vegetables and fruits contain some of the elements essential for building up the body. The mineral substances build and maintain the bones and teeth, and help to keep the blood and other body fluids in good condition.

During my trip to the north on the Better Farming train I came into contact with many enthusiastic settlers, who were anxious to improve their gardens and surroundings. They told me of their troubles in selecting suitable plants for their district, where for part of the year the weather is extremely hot and little water can be spared for the garden; later on in the winter the frosts are severe, and at all four seasons the roots of the plants are liable to attacks by ants.

Before giving the list of ornamental shrubs suitable for farm gardens, I shall mention a few points regarding the planting of them.

The individual habits of the plants should be known so that suitable positions may be assigned to them. It often occurs that plants requiring dry positions are planted in groups, with the result that they are over-watered and grow unsatisfactorily. To produce good trees, suitable conditions are necessary—light, air, water, good drainage, fair soil, and in some cases, shelter.

The position in which a tree has been planted makes a great difference in its time of flowering. Some acacias if grown in a warm sheltered place will blossom two or three weeks sooner than those in exposed situations.

When purchasing young trees one should make sure that none of them has more than one stem. If allowed to grow with more, they never make satisfactory plants. Sooner or later one of the stems splits or is broken by the wind and the shape of the tree is spoiled.

In selecting plants in pots, care should be taken to see that they are not pot-bound; if plants are left too long in pots they will usually be of stunted growth. If such a plant be received at any time the roots should be combed out and the broken ones cut away. In some cases, the top growth should be pruned, otherwise the plant may receive a check when planted out. A small healthy plant is preferable to a large one, and when planted out generally grows right away. Those grown in the shade are usually tall and soft, whilst those in the open are sturdy.

When trees or shrubs are received from the nursery, they should be planted at the same depth as previously; the marks can generally be seen on the stock.

If the soil around a plant in a pot be dry, it should be given a good watering and allowed to stand for some time; then the pot should be turned over and given a sharp knock, when the plant and ball of earth should be easily dislodged. When planting, the roots should be well spread out before the hole is filled; the soil must be pressed firmly around the plant, which should be watered so that it may not receive a check in growth. If planted out in the hot weather, shading is necessary for a few days from the hot sun or winds, and the surrounding soil must not be allowed to get too dry. Stakes for support should be driven into the ground before the tree is planted to save injuring any roots. As the plant begins to grow a watch should be kept to see that the wire attaching the label to the plant does not damage it.

Trees or shrubs should not be planted either during rain or after heavy rain has fallen, as then the soil cannot be worked round the roots satisfactorily, and the ground may become trodden and hardened.

Young plants must never be simply placed in a hole in the ground and the earth shovelled around them. The soil should be reduced to a fine tilth, and well rotted cow manure or horse manure worked through the lower spit.

When deciduous plants, either trees or shrubs, are received from the nursery with bare roots, they should be heeled in at once until the ground is ready for planting. If this be not done the roots will become dry and probably the plants will die. Before planting, all injured or

dead roots should be cut off and the top pruned back to make a proper balance between root and top.

April and May is a good time to plant flowering shrubs. If planted early, and while the weather is warm, the plant will root better than if left till June or July, when the soil is cold.

Consideration should be given when planting trees and shrubs as to their height when fully grown. Mistakes are often made by planting large trees and palms too near the paths or too close to each other, with the result that the beauty of the trees is spoilt. Over-crowding is a common practice, and should be avoided. Numbers of trees fall victims to diseases if there is not sufficient circulation of air and light around them. When young trees that will take a considerable time to reach maturity are being planted, some smaller growing ones might also be planted, and as the bigger trees grow, the smaller could be removed.

When there is sufficient spare room, the taller varieties should be kept in the background.

As the foliage of most shrubs generally consists of masses of dark-green, it is desirable to plant a number of variegated specimens to break the monotony, including specimens of Bamboo, *Prunus Pissardi, Euonymus,* and Golden Elder.

Citrus Trees in the Farm Garden.

Most farmers in Northern Victoria include a few lemon and orange trees in their farm garden. During recent trips in the Better Farming train, many inquiries were made as to the cause of their failures.

When citrus trees are received after a long journey, the balled roots may be dry. If so, it is a good plan to soak the roots (without removing the sacking) in a bucket of water. Care should be taken to see wherever citrus plants are planted that the drainage is satisfactory; they should never be planted in "pot holes" in the clay where the water collects and remains stagnant; young trees planted in such places will undoubtedly suffer.

Fruit Trees.

No farm garden is complete without a few fruit trees. These can be grown with little trouble, providing varieties suitable for the district are obtained.

Young well-grown trees of good shape worked on suitable stocks should be purchased from a reliable nurseryman. A selection of different kinds should be made, so as to have two or more varieties of apples, pears, or plums, as the case may be, so that fertilization of the blossoms can take place, thus ensuring a good setting of fruit. For this reason different kinds of fruit that blossom at the same period should be chosen.

When an old fruit tree dies, or a young one is injured by accident, it is desirable to replace it by another kind of tree. Thus an apricot, plum, or peach should be planted where an apple or pear previously grew, while an apple or pear tree is recommended to fill space formerly occupied by a stone fruit bearing tree.

Trees and Shrubs for the Garden.

Mention may now be made of a few trees and shrubs worthy of a place in any garden—

Evergreen Trees.

Eucalyptus corynocalyx (Sugar Gum).—Extensively used for street planting. Useful for windbreak, shelter, ornamental, and timber. Attains a height of 40 to 50 feet.

Eucalyptus botryoides (Mahogany Gum).—Is now being extensively planted. Is ornamental, and useful for windbreaks, and for timber 60 to 80 feet high. This tree should be planted in preference to the Sugar Gum, as it is rarely attacked by borers and scale insects.

Eucalyptus citriodora (Lemon Scented).—The pleasant fragrance of the foliage renders it a most desirable acquisition. The strong lemon scent which is emitted when the leaves are gently rubbed is as powerful as that of the Lemon Scented Verbena.

Eucalyptus ficifolia (Crimson flowered gum), and *Eucalyptus calophyalla rosea* (Rose coloured).—There are many magnificent specimens of these trees, whose blossoms have many shades of colour, to be seen growing around Melbourne and in rural districts. The bright orange scarlet *ficifolia* is perhaps the most effective. Some prefer the deep crimson varieties.

Unfortunately, in purchasing either plant or seed one cannot be assured of the exact shade or colour of the flower that the tree will produce, nor the height to which the tree will grow. Some specimens reach 30 feet, others only 10 to 12 feet.

When saving seed of shrubs and trees, it is always best to select it from strong specimens, and also, if possible, from those growing in isolated positions.

Grevillea robusta (Silky Oak).—Fine ornamental tree, grows rapidly. Yields good timber and shelter. Ornamental.

Tristania conferta (Brush Box).—Quick growing tree; ornamental and useful for timber. Good windbreak.

Virgilia capensis.—One of the quickest growing evergreen trees we have, bears clusters of purple and white blossom. It flowers for the greater part of the year. Is a good shade tree. It grows as quickly as the Pepper Tree.

Brachychiton acerifolium (Flame Tree).—A native of New South Wales, and is known as the Illawarra flame tree. It attains a height of over 20 feet. It is of a fine sturdy pyramidal growth with large handsome foliage, and produces masses of scarlet flowers which are thrown out well above the foliage. Unfortunately the tree does not flower till it is some years old. The leaves drop off in January before the tree flowers.

Brachychiton populneum (Currajong).—A hardy evergreen tree, suitable to all districts. Practically free from insect pests and fungus diseases. This tree should be planted more extensively than is done at present.

Olea Europaea (European olive).—An evergreen tree that attains a height of 20 feet.

Cupressus Lambertiana horizontalis.—Commonly known as a Cypress. Makes a splendid breakwind or ornamental hedge. It stands the wind well.

Photinia eriobotrya (Loquat tree).—Useful for its fruit; also an ornamental tree for the garden.

Pinus insignis (The Remarkable Pine).—One of the most popular pines we have; rapid grower; does well in any kind of soil; one of the best to plant for shelter or for case timber.

Pinus canariensis.—Very quick grower and ornamental. Useful for windbreak, shelter, and timber.

Callitris robusta (Murray Cypress Pine).—An ornamental tree, useful for windbreak and shelter.

Agonis flexuosa (Willow Myrtle).—Evergreen weeping tree, very hardy. Useful for shade and is ornamental.

Fugosia Lagunaria (Pyramid Tree).—Evergreen tree; 20 feet high. Very handsome flowering shrub of fine pyramidal habit.

Calodendron capense (Cape Chestnut).—Tall growing evergreen tree; bears pretty white flowers with pink markings in the centre. A handsome tree, but requires plenty of room to grow satisfactorily.

Acacias (Wattles).—Cootamundra wattle.

Pycnantha (Golden).

Normalis (Queen).

Elata (Cedar Wattle).

Prominens (Golden Shower).

Ceratonia siliqua (Carob Tree).—In some parts of South Europe the pods have been used for human food. They are useful for stock.

Deciduous Trees.

Jacaranda mimosaefolia (Rose Wood of Brazil).—There is no more beautiful sight than the Jacaranda in full flower, with its lovely blue flowers and mimosa foliage; the foliage looks well when the plant has done flowering. Young plants should be protected against frosts.

Erythrina (Coral Plant).—Plants of great beauty, and their splendour is seen more advantageously when they are grown as single specimens on a lawn. Their spikes of crimson pea-shaped flowers last well. The only objection to this tree is that the flower stems have to be cut down after the flowers fade, leaving the tree bare for a time.

Melia Azedarach (White Cedar).—A handsome tree when in leaf or flower. Height, 30 feet. Grows well at Cobram and Shepparton.

Prunus Pissardi.—Has foliage of a deep crimson scarlet colour. Very effective plant for mixing in shrubberies.

Evergreen Shrubs.

Pittosporum eugenioides.—This makes a beautiful ornamental hedge. Isolated shrubs grow well, and can be kept to any size required. For a hedge, plant 1½ to 2 feet apart in single rows.

Myoporum (Boobialla).—Quick growing shrub; does well in any exposed situation; useful for hedge.

Viburnum tinus (Laurestinus).—A very useful tree where a small hedge is required. Can be kept to the height of about 4 feet. Has handsome evergreen foliage and pretty pink-white flowers; blooms in the season when flowers of most kinds are scarce.

Coprosma lucida (Looking Glass Bush).—A hardy shrub with beautiful bright green shining leaves. Very suitable for hedges. Plant 2 feet apart in single rows.

Habrothamnus elegans.—Hardy evergreen shrub with flowers of red and crimson shades. The flowers open in early summer and last till the winter months. The blooms stand well when cut, and are useful for decorative purposes. Will grow in places under large trees and shady spots where it is hard to get another plant to grow.

Schinus molle (Pepper tree).—Very hardy, useful for windbreaks, shelter, and ornament. Largely grown in the north.

Polygala grandis.—Hardy shrub, 6 feet high, bears clusters of purple coloured pea-shaped flowers throughout the winter.

Podalyria grandiflora.—Beautiful shrubs with clusters of pea-shaped flowers, which make a fine sight in the garden in September. The flowers last well when cut.

Hakea eucalyptiodes (Pincushion Flower).—Very showy evergreen shrub; flowers during the winter.

Protea (Cape Honeysuckle).—Handsome flowering shrubs producing flowers similar in shape and as large as the tulip.

Eugenia (*Myrtifolia*).—Hardy evergreen tree producing beautiful white flowers and large clusters of pink berries.

Magnolia grandiflora.—There is no shrub admired more than a good specimen of *Magnolia grandiflora.* Being a tall-growing tree, care should be taken in its pruning while young, so that it may be kept in good shape; little or no pruning is required after the trees are full grown.

Clianthus Dampieri (Sturt's Desert Pea).—Has brilliant scarlet flowers with intense black spots in the centre. One of the most magnificent native flowers in cultivation. The seed should be sown where the plant is to remain, as it will not easily transplant. Sow in autumn and spring.

Salvia Bonfire.—A beautiful dwarf-growing shrub producing long spokes of bright dazzling scarlet flowers.

Aralia.—Hardy evergreen shrub, remarkable for the beauty of its foliage.

Wigandia (Urens).—Straggling growing shrubs with large leaves and violet coloured flowers which continue to open for some time. The plants give the garden a tropical appearance.

Cytisus proliferous.—Proliferous is commonly called tree lucerne; it is much used for making hedges.

Feijoa Sellowiana.—Where there is room in the garden a plant should be put in. Whether the plant is in flower or not it is pleasant to the eye. The fruit ripens in April.

Nerium (Oleander).—Hardy, beautiful flowering shrub. Stands the heat and drought.

Leucadendron argenteum (The Cape of Hood Hope Silver Tree).—Beautiful distinct shrub with leaves 6 to 8 inches long which, when fully developed, shine as if frosted with silver.

Laurus (*Camphora*) *officinalis* (Camphor Laurel).—A beautiful shrub. Does well in hot climates. Useful for shelter and windbreaks.

Laurus nobilis (Sweet Bay).—Evergreen shrub with scented leaves. This plant is liable to be attacked by scale if not given attention.

Euonymus aurea (Spindle Tree).—Hardy evergreen tree with ornamental foliage.

Deciduous Shrubs.

Lagerstroemia indica.—A native of China. Grows about 8 or 10 feet high with rose-shaped flowers. Owing to the peculiar crimping of the petals, it is called the Indian Crepe Myrtle flower. It should be planted in a sunny aspect and sheltered from cold winds.

Weigela (*Diervilla*) *rosea.*—Beautiful dwarf spring-flowering shrubs 4 feet high.

Pyrus (*Cydonia*).

Pyrus (*Japonica*).—No garden should be without this beautiful scarlet flowering plant, which makes such a show in the garden early in the spring when flowers are scarce. It is hardy, and suitable for training against a wall or fence. Thin out when done flowering.

Poinciana Gilliesii (Bird of Paradise Tree).—A native of South America.—Bears orange and red flowers, and its foliage is very beautiful. I have seen it growing in Melbourne, Bendigo, Horsham, Cobram, Shepparton, Mildura, and Geelong.

Forsythia.—One of our best early spring-blooming plants. Its bright golden bell flowers are produced all over the plant. They last in water when cut. This plant grows 6 to 7 feet high.

Dwarf Shrub.

Atriplex nummularia.—Old man salt bush. Useful for small hedges. Plant 18 to 24 inches apart.

Palms.

Phœnix dactylifera (Date Palm) and *canariensis* are the most suitable plants to grow in the north; *Brahea filamentosa* could also be included.

Evergreen Climber.

Bougainvillea magnifica, Variety Traili.—One of the most handsome climbers we have. Flowers in great profusion during the summer and autumn. If the plant be kept trimmed it will produce better flowers.

Roses.

It is a very hard matter to select the best twelve roses. As tastes differ prospective growers could not do better than consult the *Argus* list.

A CONVENIENT STERILIZER FOR DAIRY UTENSILS.

By D. Rutledge, Dairy Supervisor.

The growing number of Herd Testing Associations provides the best of proof that many dairy farmers are making a strong endeavour to better their monetary returns by increasing production per cow, but unfortunately there is, in the excessive quantity of inferior produce

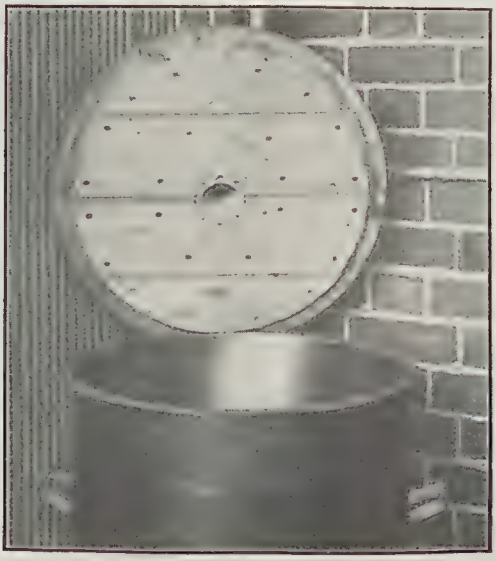
Copper with Wooden Lid in Position.

being marketed, ample evidence that there are still farms where the quality, as well as the quantity, of the output might well receive more attention. And, no matter what the production per cow be, if the quality of the product sold is not as good as the best, then some of the profits are being sacrificed.

It is therefore imperative that those engaged in any section of the dairying industry, whether it be the production of milk, cream, or butter, should realize how great is the necessity for care if a first class article is to be produced.

It should be well known to dairymen that cleanliness and coolness are essential, but the former is only too frequently very lightly interpreted. In the hope of inducing a more serious consideration of what is meant by cleanliness on the dairy farm let us review the following facts:—

Milk from a healthy cow is, when cleanly drawn into a sterile vessel, almost free from the small living organisms known as bacteria which bring about deterioration in milk and its subsequent products. Therefore, the keeping quality of milk is very largely in the care of the milker.



The Lid (lower side) of the Copper.

Now the conveyor of these bacteria is, in all cases, dirt of some kind, and the greater the amount of dirt allowed to enter milk the greater the number of bacteria that will be present, and the quicker the deterioration. The dairyman's aim should therefore be to close all possible avenues of access of dirt, and to help towards this end the cow-shed must be clean and have an impervious floor. For the same reason the cow's udders should be carefully washed and the milker's hands must be absolutely clean. But the greatest source of danger is the non-sterile utensil, and this fact is not nearly so well known amongst dairymen as it should be.

By a sterile utensil is meant one devoid of living organisms, or, to put it in plainer language, one that has been carefully rinsed and washed

and then subjected to a sufficient degree of moist heat (scalding or steaming) to destroy all lurking traces of milk or wash-water, and all potential strongholds of bacteria. Sufficient heat is indispensable. Heat, however, must not be applied to milky utensils. The time for steaming or scalding is after all trace of milk has been removed by a preliminary tepid water washing.

A Specially Constructed Steaming Chamber.

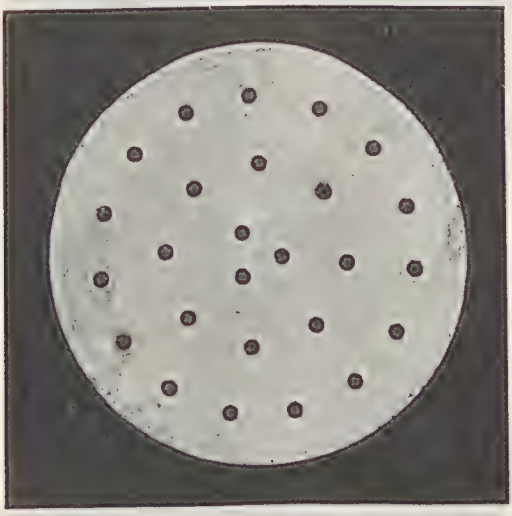
Note.—After sterilizing, small parts, utensils, &c., should be left in chamber until required for use.

It is the provision of the necessary heat that constitutes the problem in ordinary farm can-washing. Every one has not command of a steam boiler, which of course is the ideal. Many endeavour to treat a number of utensils with a kerosene tin of boiling water, or at best a copper. The result is that, excepting perhaps the first can dealt with, the whole

of the utensils are only very indifferently cleansed, because after being tipped from can to can a time or two, the water not only falls in temperature, but becomes contaminated and leaves behind a greasy film which actually provides a starter for the next lot of milk put into it. No doubt many dairy farmers have long ago realized the inadequacy of the method referred to, but being faced with what has been deemed to be the only alternative—that of purchasing and installing a steam boiler which they perhaps cannot afford—have had perforce to carry on with old methods.

There is, however, a very efficient substitute for the steam boiler, and by the details given here, it will be seen to be within the reach of even the smallest dairyman.

The first requirement is an ordinary washing copper, 20 gallons or larger, preferably with a portable iron fire-box and stand, but an

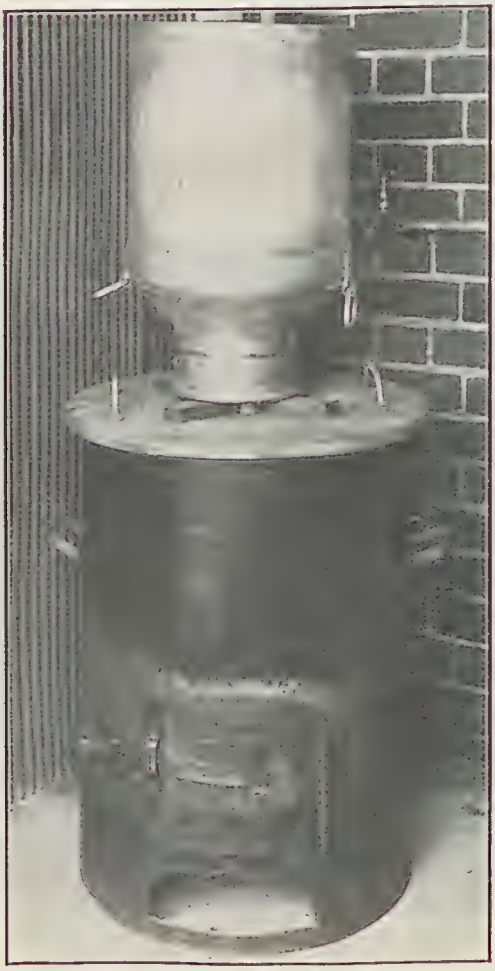


The Bottom of a Specially Constructed Steaming Chamber.

existing built-in copper may be used, provided it is not the one used for houshold washing purposes. It should have a close-fitting wooden lid which can be made as follows:—

Temporarily clamp together as many 6 x 1 tongued and grooved boards as will extend over the full width of the copper. Mark on these a circle just slightly less in its diameter than that of the copper. Saw the boards off to this circle. The resulting board shape will then be of a size to just fit inside the top of the copper. On top of this, placing the first board one inch over the edge, lay crosswise sufficient boards of similar size to extend an inch over the other edge of the copper. Clamp these closely; place the circular group on top at least an inch from either edge, and nail the upper and lower group together. Then saw off the unsawn boards one inch out from the upper all round. The extra diameter will give a flange to enclose the steam more effectively.

Bore a 2-inch hole in the centre of this lid and insert a piece of ordinary 2-inch down-pipe allowing it to protrude about 3 inches above the surface. On the top of the lid place four (4) pieces of 3 x 1 timber at right angles in form of a cross, end-on and close up to pipe. A copper fitted with a lid made in the way described will be an efficient



Sterilizing a Milk-can.

can sterilizer. When required for use it should be filled and the water brought to boiling point. If the cans, which should have been previously rinsed and washed, are placed mouth down over the protruding pipe and left there five minutes (the water in the copper being kept boiling) sterilization will be complete.

As there are always other utensils, such as cream cooler, separator parts, can lids, buckets, strainer, &c., a steaming chamber becomes necessary in which to place the utensils during steaming. The most efficient would be one made by a plumber to suit the copper in use. Proceed as follows, using fairly stout plain galvanized iron. Construct a tank or vat about 2 ft. 6 in. in depth, and with a circumference about an inch greater than the top of the copper. Make also a reasonably close fitting slip-on lid. In the bottom of the tank, and inside the circle of the top of the copper, make about twenty clear cut 1-in. holes. When using this steaming chamber, remove the wooden lid; steam will then enter through the holes in the bottom of the chamber. To ensure

An old Cream-can being used as a Steaming Chamber.

Note.—A hole has been cut in the bottom of this can so that it may fit over the pipe in the lid of the copper.

thorough sterilization, allow all utensils placed in the chamber to be exposed for about ten minutes to the steam.

If only a few small utensils are to be sterilized, an old 10-gallon cream can which is unfit for further use as such, can be made to take the place of the more expensive vat. First cut a hole in the bottom of the can just large enough to fit over pipe in copper-lid. Set the can on the copper-lid with pipe intruding. Insert the utensils to be steamed, and replace lid on can. In this case, too, about ten minutes is required for sterilization.

This outfit is recommended by the National Institute for Research in Dairying, Reading, England.

CHARLTON CROP AND FALLOW COMPETITION, 1926.

Report by the Judge (J. Brake, B.Agr.Sc., Senior Inspector of Agriculture), Assistant Judge, A. J. Vasey, B.Agr.Sc., Science Field Officer.

The rain received in the Charlton district for 1926 up till the 21st November was 14.2 inches, whilst in the growing period of the wheat, viz., 1st June till the 21st November, 7.57 inches fell. Notwithstanding the fact that it was considered a somewhat dry season the crops were good. The weather conditions, however, apparently had a detrimental effect on the working of the fallows, as they were, on the whole, not worthy of the crops growing on the same farm.

The outstanding excellence of certain fallows gave the impression that, generally speaking, the black land was not receiving the attention it merited, and that more careful working of this land would raise the yield several bags per acre.

On the red land ten or eleven bags is perhaps approaching the optimum yield, but this standard is manifestly below what is possible on black land.

In some instances the crops were on the dirty side, but all were fairly true to type. The activities of certain farmers is to be commended in trying out varieties which have proved themselves in official tests, and which are recommended by the Department as suitable for the existing district conditions. Mr. F. W. Judd is especially prominent in this respect. Ranee, Free Gallipoli, Wannon, and Nizam were all noticed in various parts, and of these the two first named looked very promising indeed.

Loose Smut was not found in any quantity this season, but Take-all and Flag Smut were fairly prevalent; the dry spring of 1925 would be, possibly, the reason for this, in part at any rate, as the lack of moisture in the fallows would enable some of the spores of both diseases to lie in the soil ungerminated. Much of the land inspected would have been for this reason all the better for a crop of oats—a crop that is immune from the attack of these diseases.

Rotation of Crops.

Many farmers are beginning to realize the necessity for the growing of another crop such as oats in rotation with wheat. This has obviously been brought about by the gradual creeping in of more disease to the wheat crop, and the stiffening of the soil due possibly to humus exhaustion. The result of these conditions is to be seen directly in the falling away of the yield, and when that happens the remedy (which is also a preventative if practised earlier) lies in the adoption of a sound rotation system which will help to stamp out disease, and at the same time tend to increase fertility from year to year.

Instances of the efficacy of oats, together with the burning of stubbles in controlling the diseases of ground-borne infection (Flag Smut and Take-all) were seen in the crops of Mr. D. Gillies and Mr. A. R. Blackwood.

There is a practice in vogue where large areas are held to let the land out to pasture every fourth year, thus working a four-course rotation—fallow, wheat, oats, pasture; where this is done it must be remembered that the growth of natural grasses tends to nullify the good effects of the rotation in disease control, because some of the grasses that appear, such as Barley Grass and Spear Grass, act as hosts for Take-all, and help to keep the disease alive. A good substitute for the pasture is a light sowing of oats for feeding-off purposes; this will give better feed, and will help to crowd out the objectionable grasses. In any case, whatever is on the paddock, a burn, where possible, should always precede fallowing for the next wheat crop.

Awards.

Name.	Variety.	Yield.	Purity and Trueness to Type.	Absence of—		Evenness.	Total.	Total for Fallow, 1925.	Grand Total Fallow and Crop.
				Weeds.	Disease.				
Possible Points ..	.. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
	75 acres of Crop on Black Land.								
A. R. Blackwood	Federation Wannon	33	19	14	14	15	95	93½	188½
W. O'Connor ..	Ranee	35	17	14	14	15	95	92½	187½
J. Bartlett ..	Federation ..	26	19	13	12	13	83	93½	176½
T. N. Judd ..	Minister ..	25	18	13	14	14	84	90	174
G. Cox ..	Ranee College Purple Bald Early Nizam	24	18	14	14	13	83	90½	173½
A. J. White ..	Federation ..	24	16	13	12	11	76	93	169
S. Perry ..	Federation Wannon ..	23	17	13	13	12	78	91	169
	75 acres of Crop on Red Land.								
A. R. Blackwood	Federation ..	35	19	13	13	14	94	91½	185½
F. H. Judd ..	Currawa Free Gallipoli Rajah Ranee	27	19	14	14	15	89	88½	177½
J. McDonald and Sons	Rajah	26	18	14	14	15	87	86	173
S. Perry ..	Federation ..	27	18	14	14	14	87	83	170
S. J. Adams ..	Federation ..	22	17	12	13	13	77	92	169
	75 acres of Crop on Mixed Land.								
A. R. Blackwood	Federation ..	35	19	14	14	15	97	92½	189½
F. W. Judd ..	Ranee	28	18	14	14	15	89	93	182
	Rajah Wannon Free Gallipoli								
D. Gillies ..	Federation ..	29	16	14	14	14	87	90	177
T. N. Judd ..	Currawa ..	26	18	14	13	14	85	82	167
G. Cox.. ..	Nizam ..	26	16	14	14	14	84	91	175
F. J. Edwards ..	Major	29	15	13	13	13	83	90	173
P. Carmody ..	Major	23	15	12	13	13	76	89	165
	Federation ..								
	Whole of Crop.								
	Acreage Sown.								
A. R. Blackwood	278 acres ..	35	19	14	14	15	97	91½	188½
F. J. Edwards ..	540 acres ..	32	16	13	13	13	87	90	177
G. Cox.. ..	410 acres ..	26	17	14	13	13	83	89½	172½
S. Perry ..	760 acres ..	25	18	12	13	13	81	90	171
A. J. White ..	470 acres ..	26	16	13	12	11	78	90	168

Details of Winning Crops.

Two of the most attractive crops seen in the district were Mr. O'Connor's field of Rance and Mr. A. R. Blackwood's Federation and Wannon, which tied for first place in the crop section of the 75 acres on black ground competition. As indicated by the points awarded, the two exhibits were of a very high quality from every standpoint; although the purity was very good in both crops it was here that Mr. O'Connor's crop suffered in comparison with that of Mr. Blackwood's owing to the presence of a very few heads of Free Gallipoli and other wheats. On the other hand, Mr. Blackwood's crop was estimated to yield a trifle less than the other, and lost marks accordingly. Both crops were sown in the middle of June with approximately the same quantities of seed and superphosphate. Eighty pounds of dry pickled seed and 106 lb. of superphosphate per acre was used by Mr. O'Connor,

Mr. S. Perry's Crop of Federation.

and 78 lb. of seed and 112 lb. of superphosphate by Mr. Blackwood. The latter used bluestone for portion of the seed, and dry-pickled the remainder; the use of the bluestone would probably have justified an increased rate of seeding.

The uniform excellence of Mr. A. R. Blackwood's wheat won him first place in the other three crop competitions, namely, 75 acres red land, 75 acres mixed land, and the whole of competitor's crop. His red land was winter fallowed, whilst portion of his mixed land and the whole of his black land was summer fallowed. One of Mr. Blackwood's paddocks was severely affected by patches of Take-all. The rotation followed in this paddock was wheat, oats, fallow, wheat, but after none of the crops was the stubble burnt, although the first wheat crop was badly attacked by the disease. There is little doubt that the

failure to burn the stubbles materially assisted in allowing the disease to be carried over on the wheat stubble and in the soil to the crop this year.

Mr. Blackwood regarded this as a clear indication of the necessity of the burning of the stubbles in conjunction with the growing of oats for the stamping out of Take-all.

The average quantities of seed and superphosphate used on all crops were 78 lb. seed and 97 lb. superphosphate.

Experiments at Longerenong conducted for the last ten years show that the most profitable quantities for use on Wimmera land are 75 to 80 lb. of seed and 1½ to 2 cwt. of superphosphate. That being so, it is fairly certain that the rate of manuring at Charlton could be profitably increased by at least 20 or 30 lb. per acre.

It is important to realize that the higher quality land can profitably use a greater amount of manure than land of lower quality; likewise good fallow will profitably use a greater quantity than neglected fallow.

Mr. A. R. Blackwood's Crop—Variety, Hard Federation.

The dry method of pickling is firmly established in the district, 55 per cent. of the competitors' crops being grown from seed pickled with copper powder.

The Fallows.

The fallows in the black-land section were on the whole disappointing. The mulch generally used was on the coarse and deep side with, in more than one instance, the clods below and the finer particles on top. Well defined seed-beds were often conspicuous by their absence, while weed growth was rather too prominent.

A portion of Mr. A. R. Blackwood's winning exhibit was summer fallowed to four inches with a Sundercut in March, then scarified in June. The remainder was ploughed in July and twice harrowed, then the whole area was harrowed in mid-August, Wimmera-scarified with harrows attached in early September and the same again in mid-October.

Mr. F. J. Edwards was second with a summer fallow, mouldboard ploughed in March three inches deep, springtoothed in April, Wimmera-scarified in July, and cross springtoothed in September.

The three entries in the Red Ground Competition were good; in one instance the red fallow was much superior to the black fallow on the same farm. Messrs. J. McDonald and Sons' exhibit in this section was almost ideal, and they deserve great commendation for the improvement over that exhibited last year. That of S. J. Adam's had been set back by a recent harrowing which had rendered the surface rather too fine for this type of country.

Messrs. McDonald and Sons' was mouldboard ploughed in June to 3½ inches; it was harrowed in August, springtoothed in September, and springtoothed across in October.

The treatment of red ground is a study in itself; it generally requires less working than the black, and the surface should be left in a rougher state. Gypsum has not yet been tried officially on the red Charlton soils, but tests on the stiff soils at Salisbury, Goroke, &c., would lead us to expect a beneficial result. Any farmer making a test for himself should apply 30 cwt. to 2 tons per acre of the gypsum (Copi) on the surface of the fallow at any convenient time, preferably, perhaps, in the spring. The application should be made to red land only as the gypsum cannot assist the black land in any way.

In the mixed land section Mr. A. R. Blackwood won with a nice fallow, of which portion was summer and portion winter fallowed. Mr. F. W. Judd was second with a piece of new ground.

Fallow Awards.

Name of Competitor.	Mulch.	Moisture.	Absence of Weeds.	Cultivation.	Total.
Possible Points	**25**	**25**	**25**	**25**	**100**
75 Acres of Black Ground.					
A. R. Blackwood	24	22	23	24	93
F. J. Edwards	22	22	22	23	89
P. Carmody	22	22	22	22	88
T. N. Judd	21	23	22	20	86
W. O'Connor	21	22	22	21	86
A. J. White	20	21	24	19	84
75 Acres of Red Ground.					
J. McDonald and Sons ..	25	23	24	24	96
A. J. White	23	23	21	23	90
S. J. Adams	23	22	22	22	89
75 Acres of Mixed Ground.					
A. R. Blackwood	24	22	24	24	94
F. W. Judd	23	20	24	24	91
G. Cox	20	21	22	21	84
T. N. Judd	21	22	20	21	84
Whole of Fallow.					
A. R. Blackwood	23	22	23	24	92
A. J. White	21	22	22	21	86
T. N. Judd	20	22	21	20	83
G. Cox	20	20	22	21	83

A feature of this year's competition is the sweeping success of Mr. A. R. Blackwood; his excellent display of crops and fallows is typical of everything connected with his farm, and whilst Charlton has such men in the district there is little need to look elsewhere for examples of the best farming methods.

In conclusion, we wish to record our appreciation of the courtesy and helpfulness displayed by the members of the Society, especially the secretary, Mr. Jas. S. Bennett. Such co-operation goes a long way in assisting the officers of the Department in competition work, which after all is important, because competitions are the means of collecting details of the proved practices and better methods found to be most profitable in the older districts and passing them on to the newer districts.

MALLEE WHEAT YIELDS.

RESULTS OF OFFICIAL EXPERIMENTS.

H. A. Mullett, B.Ag.Sc., Superintendent of Agriculture.

WALPEUP.

Hereunder are the results of the experimental wheat plots conducted by the Department of Agriculture in co-operation with Mr. R. C. F. Gniel, of Walpeup, near Ouyen.

Variety Wheat Plots.

Seventeen plots, each one-third of an acre, sown 11th May on well-worked fallow. Seed 62 lb. per acre, with superphosphate 99 lb. per acre. Pickled with copper carbonate powder, 2 oz. per bushel. Type of soil, virgin sandy loam.

—	Bushels Per Acre.	—	Bushels Per Acre.
Nizam	36·4	Ranee	27·6
Free Gallipoli	33·1	New Crossbred Ranee X Rajah	26·2
Currawa	32·6	Mogul	25·0
Yandilla King	32·6	Omrah	23·3
Sepoy	32·1	Rajah Selection No. 228 ..	23·0
Ghurka	30·3	Sovereign	22·6
Confederation	28·8	Federation	21·9
Federation	28·5	New Crossbred Golden Grain X Bobs	19·4
New Crossbred L.4119, Ranee Selection	27·6	Rajah	18·2

Wheat Manurial Experiments.

Nine plots, each one-third acre, sown on well-worked fallow, 12th May, Federation wheat, 62 lb. per acre, pickled with copper carbonate, 2 oz. per bushel. Manures as under:—

	Bushel per acre.
No manure	22.5
Super. 30 lb. per acre (average of 2 plots)	25.4
Super. 60 lb. per acre (average of 2 plots)	26.8
Super. 90 lb. per acre (average of 2 plots)	27.2
Super. 90 lb. per acre (top dressed in Spring)	24.8
Super. 120 lb. per acre	27.2

The plots are situated on virgin soil which was cleared and fallowed last year. The land is a sandy loam, and considerably lighter than that upon which the plots were located the previous year. The yields obtained were unexpectedly heavy. A month before harvest, the wheat on most of the plots, though tall, appeared likely to yield between eight and nine bags an acre. However, it finished uncommonly well for a Mallee crop, a fact which must in a large measure be attributed to the judicious conservation of moisture in the fallow on the new land on which the crop was grown.

Although reasonable care had been exercised in choosing the site for the plots, it became apparent, once the wheat began to grow, that certain varieties, namely, Nizam, Free Gallipoli, Federation (1 plot), Currawa and Yandilla King, had better conditions than the rest of the field, and for this reason the comparisons between these varieties and the balance could not rightly be made. Nizam gave a yield of twelve bags an acre, a creditable performance considering the rainfall for the year (13.9 inches).

Sepoy, with 32 bushels an acre, headed the list of those varieties which had no advantage in soil, while Ghurka and Confederation did well. The whole of the early wheats, which normally are so satisfactory in the North Mallee, were well towards the bottom of the list this year.

The officer who supervised the harvesting of the plots reported that Rajah Selection No 228 suffered less loss by threshing in high winds than Rajah itself.

As the tests have been in progress only two years, the Department does not care to make recommendations concerning the suitability of any new varieties tested, and has instructed Mr. Gniel not to distribute any unnamed new crossbreds.

The results of the manurial tests with Federation wheat confirm the evidence obtained in previous years, viz., that 90 lb. of super. per acre is the most profitable quantity to apply on well-worked fallow in the Mallee, even on new land.

Valuing the wheat at 5s. per bushel, and the manure at £5 12s. a ton, the extra profit earned as a result of various applications of manure for two years at Walpeup is—

	Per acre. s.	d.
Super. 30 lb. per acre	14	6
Super. 60 lb. per acre	20	6
Super. 90 lb. per acre	26	0
Super. 120 lb. per acre	25	6

The use of 120 lb. an acre had not proved so profitable as 90 lb., but the crop was not burned off; it was merely that the heavy dressing had failed to raise the yield beyond 90 lb. an acre. One plot sown without manure was top dressed in the early spring with super. at the rate of 90 lb. an acre. The yield was about the same as where only 30 lb. of super. was applied with the seed. This result was in accord with that anticipated.

CARWARP.

The following are the results of experiments conducted by the Department of Agriculture in co-operation with Mr. P. G. Stewart, M.H.R., at Carwarp:—

Cultivation Tests.

Fourteen plots, each ½ acre, sown to Rajah wheat, 17th and 18th May, 50 lb. seed and 75 lb. superphosphate per acre. The pickle used was copper carbonate, 2 oz. per bushel.

	Yield, 1926. bush. per acre.	Average, 1925-26. bush. per acre.
Summer Fallow—		
(1) Ploughed February, ploughed winter*	15.0	15.5
Ploughed March, ploughed winter*	16.6	16.1
Ploughed March, spring-toothed winter*	17.2	16.6
Spring-toothed March, spring-toothed winter*	18.3	15.5
Winter Fallow—		
Ploughed July, 2 inches deep*	17.3	15.5
Ploughed July, 3½ inches deep*	18.3	16.7
Ploughed July, 6 inches deep*	18.3	16.4
Ploughed July, spring-toothed (deep)	18.4	15.7
Ploughed July, spring-toothed (dry)	18.0	14.9
Ploughed July, spring-toothed*	18.8	16.1
Ploughed late (October)*	16.5	14.1
Ploughed July (neglected)*	16.7	12.4
Ploughed May, 1926 (non-fallow)*	11.1	9.0
Ploughed October (neglected)*	16.2	12.6

(1) Corresponding field ploughed March, 1925, and springtoothed in July.
* Except where otherwise stated, depth of ploughing 3½ inches, and fallows springtoothed and harrowed as required after rain to maintain mulch 2½ inches deep.

The object of the test was to compare various methods of fallowing under conditions obtaining in the North Mallee districts. The soil on which the plots were located was a good, red, sandy loam.

Rajah wheat was sown, and this, unfortunately, was badly battered by high winds, which swept the district when the crop was ripe, but before it was harvested. The heaviest plots naturally suffered most, and the early summer fallowed plots at the west end of the field bore the brunt of the storm. Plots on which the crop was light and thin suffered hardly at all, hence the yields on these were relatively inflated.

The average yields since the plots were started two years ago are appended. They are to be regarded as more reliable than the results for this year.

It will be observed that the average yields on the plots fallowed are practically double those on the non-fallowed land, while those on late-fallow and on neglected fallow are definitely below the yields on carefully fallowed plots. This is a lesson which settlers in the North

Mallee are taking to heart, and the substitution of fallow for non-fallow, and well-worked fallow for neglected fallow, will go a long way towards ensuring a steady sequence of satisfactory crops.

The average results disclosed no significant differences between summer fallow and winter fallow, or between the various depths of ploughing tested, but it was to be expected that some would be apparent as time went on. Some modification of the lay-out of the tests will be made this year to ensure greater accuracy.

The results of the Rate of Seeding Tests sown to Rajah wheat were—45 lb. seed an acre, 23.1 bushels per acre; 60 lb., 22.7 bushels; 75 lb., 23 bushels; 90 lb., 22.8 bushels.

The figures indicate that under the conditions of the test and in a very favorable season no increased yield is to be obtained from applications of seed over 45 lb. an acre. Last year, 60 lb. of seed gave the highest yield.

The test, though not conclusive, appeared to confirm the views of experienced wheat-growers that 60 lb. an acre was sufficient seed for mid-May sowing on well-worked fallow in the North Mallee.

NUMURKAH CROP COMPETITION, 1926.

Report by P. Ryan, B.Ag.Sc., Inspector of Agriculture.

A study of the rainfall records shows that the Numurkah district experienced an abnormal season in 1926. The autumn and early winter were exceptionally wet, and a tour of the district revealed many instances where the seeding operations had been seriously interfered with. In some cases where the stiff red soils had been worked down very fine, the heavy rain set the surface like a cement bed after the seed had been sown, and the young plants had great difficulty in pushing their way through, with the result that the germination was patchy. In other cases sowing had to be delayed beyond the normal and optimum time for seeding, and such late sown crops were seriously affected by the dry spring.

The competition crops were of a high standard, and gave evidence of careful cultivation. The most serious faults were the presence of wild oats and deadheads. Deadheads were very prevalent throughout the district, and were, no doubt, mainly responsible for the complaints heard from growers that the crops were not yielding as well as appearances had suggested they would. In some cases these deadheads could be definitely diagnosed as being due to Takeall (*Ophiobolus graminis*), but more frequently the symptoms showed marked differences from

those met with in typical Takeall infections. There was an absence of the characteristic black ring around the base of the stem, and the heads, instead of being white and devoid of grain, were poorly developed, a dull greenish yellow colour, and contained pinched grain. It is possible that the disease is due to a distinct causative agent, and investigations on the point are being made by the Plant Pathologist of the Department.

Federation is easily the most popular variety in the district; and, while growers are wise to continue to rely on this well-tried variety until another one is proved definitely superior, they should not overlook the claims of newer varieties, such as Free Gallipoli and Nizam, which are giving high yields under conditions similar to those obtaining at Numurkah. In this connexion farmers are advised to be guided by the results of the experimental plots that have recently been established by the Department of Agriculture at Waaia, while, of course, bearing in mind that it is unsafe to generalize on the results of less than three years.

In some cases the type of Federation left much to be desired—the heads were short, tapering, and pale in colour. It should be pointed out that if similar seed is grown year after year without any attempt being made to maintain its type by selection, it will certainly deteriorate. It was pleasing to note that many farmers had realized the position, and had either secured supplies of standard seed from the State farms or agricultural colleges, or had made arrangements to secure supplies. It must be pointed out that the seed stations can only supply individual farmers with small quantities of any variety, and, having obtained this basis, farmers should build up their own supply, taking the necessary care to keep it pure and true to type.

An interesting point illustrative of the influence of crop competitions is revealed by reference to the report of Mr. Mullett as judge in 1924. Mr. Mullett then commented on the fact that the general rate of seeding in the district was 60 lb. per acre, and expressed the opinion that, in view of the germination troubles sometimes experienced, farmers would be well advised to increase the amount of seed sown to at least 70 lb. per acre. He also pointed out that pickling with copper carbonate would be particularly advantageous in promoting a quicker germination than would be secured with seed pickled with bluestone or formalin. Analysis of the data supplied by competitors showed that the average rate of seeding for the crops judged was 71 lb. per acre, while over 80 per cent. of these crops were pickled with copper carbonate.

There were eleven entries in the competition, and Mr. W. White takes first place with a heavy crop of Federation. Although this crop had been fed off it was rather tall, but was exceptionally well headed, even in the tallest patches, was true to type, and practically free from disease, and was free from weeds, save a sprinkling of wild oats.

Mr. G. Young's crop was very heavy in patches, but was not as even as the winning crop. Owing to the wet weather at seeding time, the sowing of portion was delayed, and the late sowing followed by the dry spring had had a prejudicial effect on the crop.

Awards.

Competitor.	Yield.	Trueness to Type.	Freedom from—		Evenness.	Total.
			Weeds.	Disease.		
Maximum points	**35**	**20**	**15**	**15**	**15**	**100**
W. White	35	18	13	14	13	93
G. Young	33	18	12	14	12	89
J. Fowler	30	17	12	14	14	87
J. Mortimer	29	16	13	13	15	86
McArthur and Thornton ..	28	18	14	12	14	86
D. F. Rendle	28	18	13	12	13	84
P. Tweddle	27	18	14	13	12	84
G. Close	27	16	13	14	13	83
E. C. Watters	26	16	12	12	11	77
H. Formby	26	20	10	10	11	77
Mrs. Christie	24	16	10	12	11	73

Comments on Some of the Crops.

Mr. White's winning crop was grown on land that was ploughed the last week in June and the first week in July, and harrowed twice in September. Portion was spike-rolled in April, and the whole was cultivated with the combine in two directions in April. In May it was cultivated with the rigid tyne cultivator, followed by the harrows, and was then drilled with 75 lb. of seed and 90 lb. of superphosphate. The seed was pickled with copper carbonate dry pickle.

Mr. Young fallowed his land with a mouldboard plough in July, harrowed it in September, October, and November, spike-rolled and harrowed it in March. Early in April it was cultivated with the rigid tyne cultivator, and cros-cultivated with the same implement early in May. It was again cultivated with the rigid tyne cultivator at the end of May, and was then drilled with 64 lb. of seed and 95 lb. of superphosphate. Owing to wet weather, the drilling was interrupted, and was not completed until towards the end of June.

Mr. John Fowler's land was ploughed in July and harrowed immediately, spike-rolled in September, spring-tyned late in September, cultivated with rigid tyne in April, and sown with combine in May with seed 75 lb. and superphosphate 90 lb. per acre. The seed was pickled with copper carbonate powder.

Mr. Mortimer ploughed his land early in July and harrowed it immediately. It was cultivated with the rigid tyne cultivator in the middle of October, harrowed early in January and at the end of March, cultivated with the rigid tyne cultivator on 12th May, and sown immediately with 83 lb. of seed and 130 lb. superphosphate per acre. The crop was harrowed immediately after sowing, and was grazed off with sheep from 14th June to 10th July.

The land on which Messrs Thornton and McArthur's crop of Union wheat was grown was ploughed and harrowed in July, scarified in October after rain, spike-rolled in March and scarified, harrowed in April, and drilled on 20th April with 70 lb. of seed and 60 lb. superphosphate. The seed was pickled with copper carbonate. At first

glance this crop appeared to be the outstanding one in the competition, but examination revealed a large number of poorly-developed heads with pinched grain.

The excellent arrangements made by the Secretary (Mr. George Fowler) greatly facilitated the work of judging, and I desire to thank Mr. Fowler and the other members of the society for the courtesy and hospitality extended to me during my stay in the district.

HAY AND WHEAT COMPETITIONS, MELTON, 1926.

Report by the Judge, P. D. McRae, Field Officer.

The Hay Competition.

The Melton district suffered greatly from adverse weather conditions during the 1926 season. In the first half of the growing period of the hay crops the only rain received was from light showers. Later on, however, rain fell, but it was still quite inadequate to sustain normal growth. The result in many cases was an almost complete failure of the crops. In others, better methods of tillage, combined, perhaps, with a greater moisture-holding capacity of the soil, resulted in payable crops being produced. All those which were entered for competition demonstrated what can be accomplished by means of sound farming methods. They were well grown and free from weeds and disease.

In a comparatively dry district such as Melton, fallowing is, as with wheat, the basis of successful hay-growing. All the crops which remained in the competition to be judged (some were withdrawn on account of their comparative failure) were grown on land which had been fallowed early and afterwards cultivated at frequent intervals.

Next in importance is the application of adequate quantities of fertilizer. As was pointed out by Mr. Brake in his report on this competition last year, the most profitable application at the Research Farm at Werribee, under somewhat similar conditions, has been found to be 1½ cwt. per acre. This amount is greatly in excess of that usually applied at Melton. It should be remembered that when hay is grown and sold off the farm, practically every particle of plant food which has been withdrawn from the soil is forever lost to it. Hay is, therefore, under these conditions, a most exhausting crop, and due care must be taken that the land is not impoverished, either by continuing to grow hay for too long a period, or by withholding reasonable dressings of manure.

A satisfactory feature of the competition this year was the almost complete absence of weeds and disease, but points had to be deducted in most cases on account of impurities. A notable exception to this was the crop grown by Mr. T. Norton, in which practically not a plant of a foreign variety was to be found. This crop, which was shown in the oats section, was also very level and even, except in a few places that had been missed by the drill. Owing, perhaps, to the fact that it was sown later than usual, it had not stooled out as well as it might have done; it was comparatively green, and had been only very lightly "tipped." It was, on the whole, a very fine crop, and Mr. Norton

stated that the land on which it was grown had been under cultivation for twenty years. This season it had been very thoroughly cultivated, as will be seen by the following details:—Ploughed early in July, 1925, to a depth of 4½ inches, harrowed twice, rolled and spring-toothed in August, spring-toothed twice and harrowed in October, spring-toothed in November and again in January, harrowed in March, spring-toothed, harrowed and rolled in April, drilled with a combine the first week in May, harrowed just before the crop came through the ground, and after, it was up-rolled. Ninety pounds of Algerian oats were sown, with 130 lb. of bone and superphosphate.

Messrs Cameron and Cantwell also had a good, heavy, clean crop, which had been rather badly "tipped" by hot winds. It contained a good deal of barley. The land was ploughed to a depth of 5 inches in July-August, received a heavy harrowing after rain in October, spring-toothed in November, and again at the end of January, and then harrowed. It was sown with a combine and rolled; the quantities of seed and superphosphate were respectively 90 and 100 lb.

In the Wheat and Oats Section, Messrs Wallace Brothers showed a very fair crop. It contained a few patches with undergrowth; some barley and many "strangers" were seen throughout the crop. The cultivation was as follows:—Fallowed 5 inches deep in August, harrowed in September, spring-toothed during that month and again in February. It was then rolled, spring-toothed, drilled, harrowed, and rolled in March. The seed used was Warden wheat and Algerian oats mixed in the proportion of 1 bag of wheat to 3 of oats, and sown at the rate of 2 bushels per acre; the quantity of superphosphate used was 112 lb.

Mr. V. Butler's crop of Warden wheat and Algerian oats was also a good one, but had suffered severely from lack of moisture, being badly "tipped" and also showing a good deal of dry flag. It contained some barley, and also a few smutted heads of wheat. The land had been fallowed in June 5 inches deep, and immediately harrowed. Subsequently it was spring-toothed and harrowed fourteen times. These operations were carried out after every rain, Mr. Butler being a firm believer in damp working of the soil, and refusing to touch it while dry. Seed in a 3 to 1 ratio was sown at the end of March at the rate of 2¼ bushels per acre, together with 112 lb. of superphosphate.

Details of Awards.

Competitor.	Yield.	Type, Purity, Co.or.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible points ..	**50**	**15**	**15**	**10**	**10**	**100**
Section—Oats for Hay.						
T. Norton	33	15	14	10	9	86
Cameron & Cantwell ..	40	11	15	10	9	85
Section—Wheat and Oats for Hay.						
Wallace Bros. ..	40	11	14	10	9	84
V. Butler	35	12	14	9	8	78

The Wheat Competition.

Hay-growing has in the past been the principal type of farming practised in the Melton district, but the decline in the demand for chaff has caused the growers to turn their minds towards other avenues of production. The prospects of wheat-growing are thus receiving a good deal of attention. Crops have been grown in a more or less desultory manner for some years, but no standard practice has yet been evolved, and the industry cannot as yet be said to have advanced beyond the experimental stage. Fortunately the State Research Farm, Werribee, is close to the district, and the results of the investigations conducted there are available. The activities of the Melton District Exhibition Committee in organizing visits to the Research Farm, thus enabling farmers to themselves use the results of the experimental work there, should prove of great benefit.

Details of Award.

Competitor.	Yield.	Purity.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible points	**35**	**20**	**15**	**15**	**15**	**100**
J. Hickey	33	19	10	14	14	90
G. Coburn	30	19	13	14	13	89
V. Butler	26	18	14	10	14	82
C. E. Barrie	25	15	14	14	13	81
H. Crozier	27	17	10	10	13	77

Mr. Hickey fallowed in August to a depth of from 3 to 4 inches, spring-toothed once during the last week in January and twice in May, drilled about the middle of the latter month with 1¼ bushels of seed and 80 lb. superphosphate, the land being afterwards harrowed and rolled.

This was a fairly heavy crop of Major wheat, grown on land which had been continuously under cultivation for 20 years, and had in that period been fallowed only five times. This treatment was probably the cause of the chief fault observed in the crop, viz., a heavy growth of wild oats. In a dry season such as the one just experienced, when the crop requires every available drop of moisture, that taken to maintain the growth of wild oats must reduce the yield of wheat considerably. The crop was fairly pure and free from disease.

Mr. G. Coburn ploughed in August from 3 to 4 inches deep, and subsequently used the spring-tooth after rain three times. The seed was sown with a combine in May at the rate of about one bushel per acre, with 1 cwt. of superphosphate. Mr. Coburn does not believe in such a light seeding, but it was forced on him on this occasion by somewhat unusual circumstances. He ordered a quantity of Free Gallipoli seed, but obtained only half the wheat he required, and this had to be distributed over an area reserved for the larger amount. The crop

was, consequently, rather thin, but was well headed, pure, and very even, excepting where patches had been missed by the drill. It also contained patches of wild oats.

Mr. V. Butler had a very fine tall crop of Warden, free from weeds. It was rather badly affected with flag smut. The land had had a very short fallow period, having been ploughed as late as January. It was then harrowed, and later on was cultivated twice and harrowed. At the end of May 1½ bushels of seed and 1 cwt. of manure were drilled in and the ground rolled.

Mr. C. E. Barrie ploughed in September to a depth of 3 inches, disced in January, spring-toothed in April, and sowed with a combine in May. He used Currawa wheat, sowing at the rate of 1¼ bushels, with 1 cwt. of superphosphate per acre. This was a short, very even crop, free from weeds and disease, but containing a good deal of barley.

The crop of wheat resembling Turvey, sown by Mr. H. Crozier, would give a satisfactory yield, but it contained many weeds, and was badly affected with loose smut. The ground had been ploughed in November, spring-toothed three times in January, drilled second week in March, and harrowed.

The results obtained this year under adverse conditions would appear to indicate that wheat can be produced satisfactorily in this district. Fallowing is, of course, the first essential to success. There is no need to labour this point, as the necessity for fallowing is generally recognized. It should be borne in mind, however, that to obtain the maximum benefit the ground should be ploughed early, and subsequently prevented from setting hard, and all weed growth must be suppressed. This latter provision is doubly important, since weeds not only rob the fallow of moisture, but also help to carry on certain diseases from year to year.

The results of several experiments made at the Research Farm, and extending over a number of years, may be of interest. In the first place, it has been found that sowing early, say in May, gives better results than the later sowing successfully practised in other districts.

At the same time, dry sowing is not recommended, for there is a very real danger that the crop may be smothered by a heavy growth of Cape weed and other weeds if the seeds are not germinated and destroyed before the crop is sown.

The results of seeding and manurial tests so far indicate that about 90 lb. of seed and 1½ cwt. of superphosphate return maximum yields. The determination of the best variety for the district is a matter of great difficulty, as, owing to the conditions varying from year to year, no one variety gives consistently the highest yields. As an average over a fairly long period, however, it may be said that both Free Gallipoli and Major have given very satisfactory results.

Notes on Smuts.

A few notes regarding smuts may not be out of place. During the judging it was found that there was some confusion respecting those which attack wheat. In view of the damage for which they are responsible it is advisable to be able to identify them, and to be familiar with the best means of coping with them.

Contrary to the general belief, the common serious smuts are quite distinct from one another, and are three in number. They are—(*a*) Bunt, ball smut or stinking smut, (*b*) loose smut, and (*c*) flag smut.

Bunt.—The head of the wheat is formed, and to the casual observer appears almost normal, but on close inspection it is found that the place of the wheat grain has been taken by a mass of black, evil-smelling spores. The remedy for bunt is to pickle the seed with formalin, bluestone or copper carbonate, preferably the latter on red soils inclined to setting.

Loose Smut.—Black spores form on the head of the wheat, and, not being fully enclosed by the chaff, are more or less exposed to view. Later these spores are blown away by the wind, leaving only the bare stalk. Pickling is ineffective. Use seed from a smut-free crop.

Flag Smut.—This, as the name implies, occurs in the leaves. Long black streaks run parallel with the veins, and sometimes extend to the stalk. Frequently the effect is to stunt the growth to such an extent that the plant forms no ear at all.

In this case the seed should be pickled; where possible the stubble should be burnt, thereby destroying large numbers of spores. An early and well-kept fallow also helps to keep this smut in check, the moisture present inducing germination of the spores, which then perish for lack of nourishment, while probably the most effective means of all of overcoming the disease is, where it can be practised, rotation of crops.

KOIMBO CROP COMPETITION.

Report by R. G. Thomas, M.Ag.Sc., Inspector of Agriculture.

It is to be regretted that only two entries were received for the Crop Competition conducted by the Koimbo Branch of the Better Farming Association. There can be no doubt but that the movement is worthy of the full support of district farmers, as similar movements in many other districts have proved themselves to be of value in raising the standard of farming practices. In a relatively new district, such a competition should have more than ordinary beneficial results, as all concerned have naturally more to learn of their conditions, and no movement is superior to a competition in stimulating interest in any work, and in thus bringing about beneficial exchanges of opinion with advantage to all concerned.

Both entries received were highly creditable. Mr. Plant's entry of Joffre and Dart's Imperial was a nice crop, fairly even and healthy. The Joffre contained a number of foreign heads, the Dart's Imperial only a few. A little barley was present, and odd patches of charlock, but the crop was generally clean. Some flag smut was apparent, mostly in the Dart's Imperial, and a few small takeall patches.

Cultivation.—Mouldboard ploughed 3½ inches in July-August, part spring-tooth cultivated, and the remainder scarified September-October; scarified April, drilled and harrowed early in May. Seed 52 lb., and super 60 lb. per acre.

Mr. Smith's crop was also a fair one, but the seed purchased as Purple Straw was evidently very badly mixed, the percentage of foreign-heads being very high. Some barley and charlock was present, also a little takeall. Flag smut was present to a considerable extent, particularly in what were evidently strips of Federation wheat.

Cultivation.—Mouldboard ploughed August-September 5 inches deep; two-way disced twice in November, harrowed, spring-toothed and disc-drilled end of May. Seed 45 lb. per acre, with super. 68 lb. per acre.

Table of Awards.

For best 100 acres of Crop on Fallow.

Competitor.	Yield.	Trueness to Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points	**35**	**20**	**15**	**15**	**15**	**100**
S. J. Plant	35	14	12	13	13	87
E. W. R. Smith	25	7	10	11	12	65

Note.—The points allotted for yield do not necessarily indicate the estimated yield in bushels per acre.

A 16-YEAR OLD PIG.

A sow of the Large White breed, Eye Queen 10th, has recently died at the age of 16 years 7 months. The National Pig Breeders' Association believe this to be a record for longevity in a sow that has continued to produce litters of strong, healthy pigs up to the last year of her life. Eye Queen 10th (referred to as "Granny") was bred in the herd of Mr. J. Neaverson, Peterborough, on 1st March, 1910, and sold when quite young to Mr. C. Adeane, Babraham, Cambridge, in whose possession she remained until arriving at the state of almost "mere oblivion"—*sans* teeth, *sans* taste, *sans* nearly all her faculties except appreciation of the kindness and care meted out to her. "Sent to the butcher with deepest regret" might be the entry appearing against this sow in the Babraham Estate registers. Unfortunately, complete records of all the pigs produced by "Granny" are not available, but Mr. Adeane has particulars of sixteen litters—nine between May, 1911, and March, 1916, and seven from October, 1921, to September, 1925. Details were not kept from 1916 to 1921. It is safe to say, however, that this grand old sow must have farrowed between 200 and 250 pigs during her lifetime. She was indeed a worthy representative of the Large White breed. Amongst the breeding sows in Mr. Adeane's herd at the time of writing are eleven daughters and four granddaughters of Eye Queen 10th. That they are possessed of the same qualities as the illustrious matron is already evident from their breeding records.—*Live Stock Journal,* 5.11.26.

STALLION REGISTER 1926-27.

Under the "Horse Breeding Acts 1919-1925."

Part II.*—Registrations from 1st October to 31st December, 1926.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1002	Aberdeen ..	A	Light ..	Haymes, W. ..	201 Humffray-street, Ballarat
976	Actor	3	,, ..	Adams, K. ..	Foster
996	Al Borak ..	A	,, ..	Bennett, L. ..	Robin Vale
943	Baron Brilliant ..	4	Draught ..	Gillett, W. H. ..	Lara
944	,, Watson ..	A	,, ..	McErvale, J. L.	Brewster P.O.
992	Baron's Pride ..	A	,, ..	Steedman, W. ..	Lucknow
984	Bell Boy ..	A	Pony ..	Lovell, O. O. ..	Drumborg, via Heywood
985	Belmain ..	A	Draught ..	McKie, J. ..	Banyan, via Woomelang
977	Berra Bach ..	A	Pony ..	Wilson, jnr., J. ..	Marnoo
986	Blue Trout ..	A	Thoro'bred	Scott, H. ..	Lillimur
931	Bold Scott ..	5	Draught ..	Berry, W. H. ..	Horsham
991	Bombay ..	A	Light ..	Kenna, P. ..	Terang
1007	Bonnie Brae ..	A	Draught ..	Goldsmith, H. ..	Corack
983	,, Chieftain..	4	,, ..	Gilmore, H. ..	Thornton
1008	,, Crown ..	3	,, ..	Gerrard Bros. ..	Mangalore
960	Brilliant Jim ..	4	Pony ..	Scott, R. N. ..	Kongwak
942	Calais	A	Thoro'bred	Officer, Geo. ..	Kilmorey, Woolsthorpe
930	Celmar Star ..	A	Light ..	Cochrane, J. D.	Pootilla
956	Child Zebra ..	4	,, ..	O'Bree, J. T. ..	Nairung, via Piangil
964	Cleve Todd ..	A	,, ..	Hartwick, T. A.	1 Queen - street, North Essendon
948	Clydesdale Willie..	3	Draught ..	Fisher, S. ..	Belville, Panitya
980	Count Abbey ..	4	Light ..	Currie, J. ..	c/o A. J. Glenn, Birchip
941	Dibdale ..	A	Thoro'bred	Officer, Geo. ..	Kilmorey, Woolsthorpe
958	Domination ..	A	Pony ..	Lucas, C. T. ..	Pomborneit
974	Duddon.. ..	A	Thoro'bred	Wade, A. P. ..	Glen Alvie
949	Dunira James ..	3	Draught ..	Allen, G. H. ..	Box 83, Beulah
936	Dunmore's Pride	A	,, ..	Doherty, J. ..	Bungaree
978	Enterprise ..	4	,, ..	Gillis, A. ..	Racecourse - road, Newmarket
975	Favourite Lad ..	4	,, ..	Gomm, C. E. ..	Somerville
990	Fidelio	A	Thoro'bred	Smith, T. H. ..	Lalbert
951	Footnote ..	A	,,	Shaw, G. ..	Yarram
970	Gay Gordon ..	A	Pony ..	Dalziel, A. ..	Longfield - street, Stawell
929	General Harvey ..	A	Draught ..	Byron, H. E. ..	Woomelang
993	,, Scotch ..	A	,, ..	Quarrell, C. ..	Benetook, via Red Cliffs
997	Gillies Son ..	A	,, ..	Boyd Bros. ..	Minhamite
928	Glenscott ..	A	,, ..	Gibbins, A. B. ..	Murrabit
940	Gold Tuck ..	A	Thoro'bred	Bains, J. J. ..	Euroa P.O.
955	Goldie	A	Light ..	Minns, W. J. ..	Melton South
995	Graculus ..	A	Thoro'bred	Loveridge, S. ..	Corowa, N.S.W.
933	Jack McKinney ..	A	Light ..	Moriarty, D. ..	Wee Wee Rup

* For Part I. (Registrations prior to 30th September, 1926) see this *Journal* for December, 1926, and January, 1927.

Stallion Register, 1926-27—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
946	Kelvin Grove ..	5	Draught ..	Baldry, C. ..	Cosgrove
954	Kemp Daly ..	A	Light ..	Minns, G. H. ..	Melton
1006	Kingston ..	A	Draught ..	Nicol, R. P. ..	Yarram
937	King Albert ..	A	,, ..	McKay, T. ..	Malmsbury
969	,, Heedless ..	3	Thoro'bred	Manifold, J. ..	Purrumbete, Weerite
945	,, Jimmy ..	5	Pony ..	Dunn, R. N. ..	Sheriff-street, Stawell
988	,, Mauritius ..	5	Light ..	Cattlin, W. ..	Elmore
934	,, Stanley ..	A	Draught ..	Tyquin, T. ..	Laverton
973	Lord Percival ..	A	,, ..	Beard, Jos. ..	Terang
966	Merrimu ..	A	Light ..	Vallence, G. M. ..	Cohuna
952	Newton's Best ..	A	Draught ..	Oram, J. E. ..	Marnoo
989	Nyallo Prince ..	A	Light ..	McAlpine, W. T.	Hopetoun East
967	Oakdale ..	3	Draught ..	White, C. R. ..	Yarra Glen
968	Onward Star ..	A	,, ..	Murchison, J. W.	Katamatite
950	Palos	A	Light ..	Warren, R. ..	West Moolap P.O.
981	Pirateer.. ..	A	,, ..	McArthur, D. ..	Victoria Valley
982	Pleasant Journey	3	,, ..	Pharoah, W. G.	Warragul
994	Prince Edward ..	A	Draught ..	Hogan, J. ..	Gooramadda
1001	Red King ..	A	Light ..	Hollonds, W. ..	Benambra P.O.
963	Royal Escort ..	A	Draught ..	Griffiths, T. A. ..	Mile Creek, Glenrowan
965	,, McGregor ..	A	,, ..	Mortlock Bros. ..	Culgoa
953	Scotland's Bloom..	A	,, ..	Rodgers, T. R. ..	Tooan, via Natimuk
987	,, Fancy ..	A	,, ..	Daffy, T. ..	Swan Marsh
938	Sir William ..	A	,, ..	McClellan, W. A.	Bungaree
932	Standard ..	A	,, ..	Scott, J. G. ..	Hopetoun
972	Starlight ..	A	Pony ..	Giles, Jno. ..	Sunnyside, Bairnsdale
1003	Stirling Castle ..	A	Draught ..	Bryce, D. W. ..	Cowes
1004	Tinylights ..	A	Pony ..	Small, E. E. ..	San Remo
935	Tom Thumb ..	4	,, ..	Rippon, J. A. G.	Cororooke
998	Tommy Dodd ..	A	,, ..	Boyd Bros. ..	Green Hills, Minhamite
999	Vulcan	6	,, ..	Boyd Bros. ..	Green Hills, Minhamite
939	Western Lad ..	A	Draught ..	Ross, J. C. ..	Lake Bolac
947	Widgiewa Glancer	5	,, ..	Wilkinson, W. G.	Yarrawonga
979	,, Mack	3	,, ..	Hawkins & Son	Woolamai, Tocumwal, N.S.W.
971	Wiewood ..	A	Light ..	Raftery, W. ..	Shepparton
1000	Young Dundonald	A	Draught ..	Barkell, S. ..	Boorahaman
959	,, Timekeeper	A	,, ..	Boase, T. ..	Daylesford
1005	,, United Prince	A	,, ..	Young, W. G. ..	Neerim
961	Zone Time ..	A	,, ..	Gibson, Jno. ..	Benambra

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A sturdy and rapid grower; it has a strong tap-root, enabling it to stand long periods of drought. Stalks break easily, and are very succulent right through. **Will not taint the milk.** Sow 4 to 6 lbs. per acre in drills; 8 to 12 lbs. broadcast. **Will fatten 3 more sheep per acre than any other kind. 10d. lb.; 84/- cwt.**

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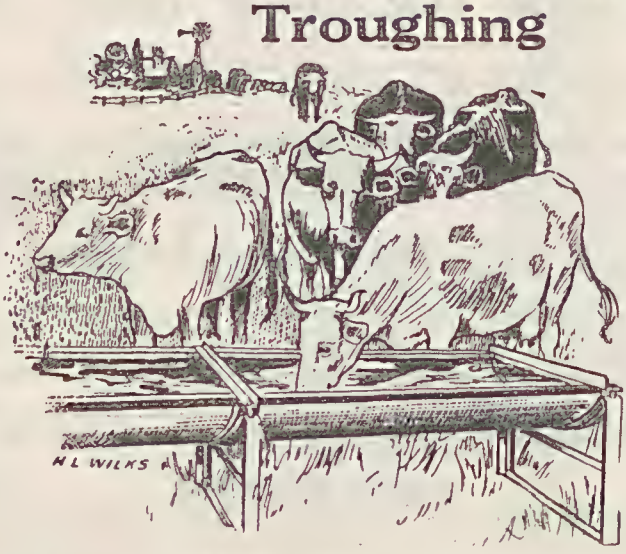

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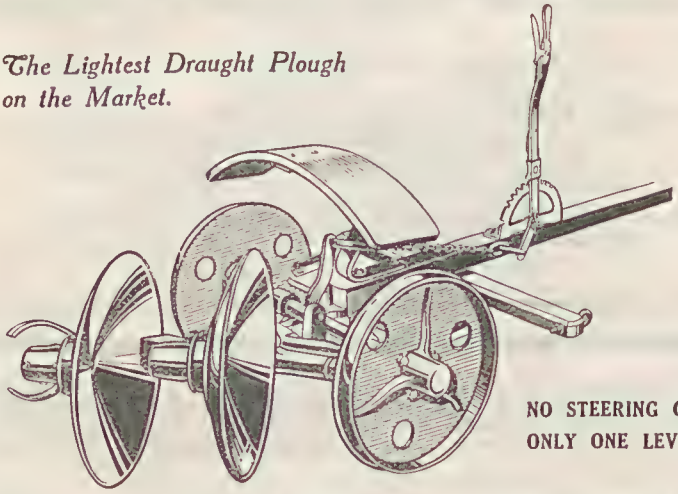

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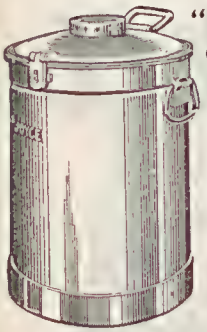

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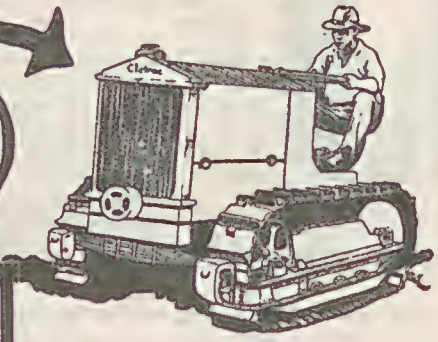

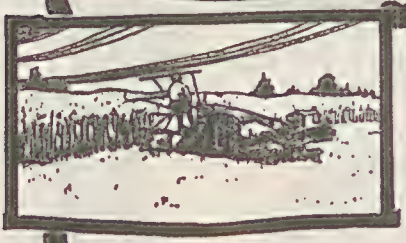

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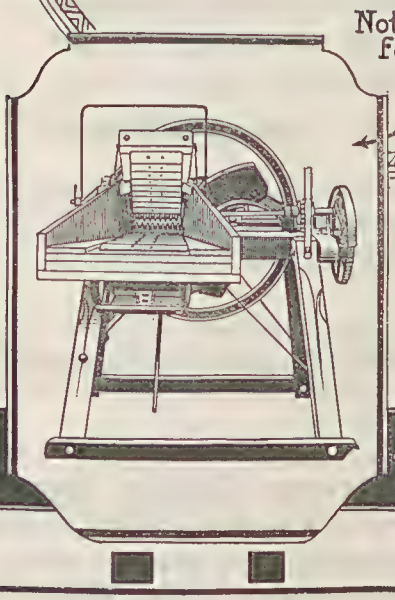

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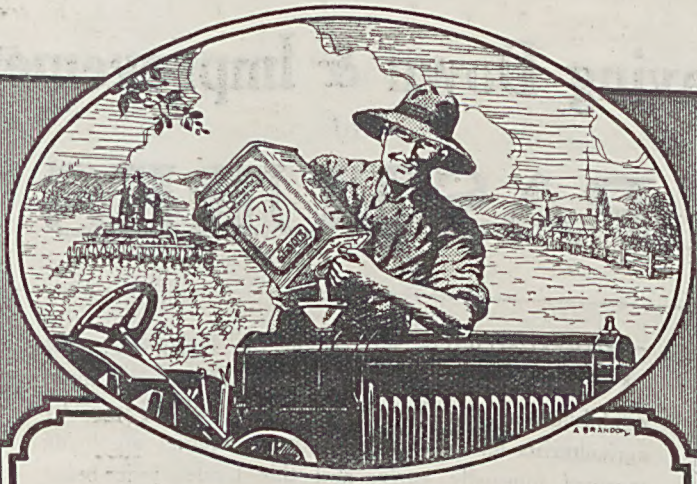

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DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department has now completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter *fat* yielded. Thus a calf from a cow with a 400 lb. butter fat record is sold for 20 guineas, one from a 300 lb. butter fat cow for 15 guineas, and so on. Bull Calves ex heifers on their first calf are sold for a set price of 10 guineas.

(For Record of Yields of dams see Red Poll Herd Book.)

SIRES IN USE:

VICTORIA VOLCANO (322 A.)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Tonga (253 A.) by Honingham Archbishop (imp.) 9702 (48 A.A.).

Tonga's butter fat yields for 6 successive lactation periods are as follow:—1916, 341 lb.; 1917, 398 lb.; 1918, 419 lb.; 1919, 479 lb.; 1920, 428 lb.; 1921, 562 lb.

BELLIGERENT (Imported) 11096 (8 A.A.)

Dam's Record (1st milking) 7144 lb. milk.

Dam's Dam's	,,	14533 lb. milk	...	4 years	average	12871 lb. milk.
Sire's Dam's	,,	10370	,,	... 7	,,	,,	9354 ,,
Sire's D. Dam's	,,	9510	,,	... 12	,,	,,	8033 ,,
G. Sire's D. Dam's	,,	10215	,,	... 7	,,	,,	9386 ,,
G.G. Sire's D. Dam's	,,	12565	,,	... 10	,,	,,	8853 ,,
G.G.G. Sire's D. Dam's	,,	10088	,,	... 2	,,	,,	9754 ,,

BIT O' 'BACCA (Vol. 3)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Nictitana (311 B.) by Nicotine (69 A.A.).

Nictitana's butter fat records for 6 successive lactation periods are as follow:—1918, 450 lb.; 1919, 396 lb.; 1920, 393 lb.; 1921, 465 lb.; 1922, 524 lb.; 1923, 536 lb.

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

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